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The
TIMBER RESOURCES
# of NEW HAMPSHIRE

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U. S. FOREST SERVICE RESOURCE REPORT NE-1
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NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
RALPH W. MARQUIS, DIRECTOR

PREFACE

A RESURVEY of the timber resources in New Hampshire was completed in 1960. This report summarizes the timber-resource situation and the changes that have taken place in the 12 years since the first forest survey of New Hampshire.

Field work for the initial survey was done entirely by the staff of the Northeastern Forest Experiment Station; the resurvey was a joint effort with the staff of the White Mountain National Forest. The National Forest personnel assumed responsibility for the resurvey of forest lands under their jurisdiction.

The timber-supply outlook for the state and the demands for timber products have changed considerably. This report describes the current forest-land area and timber volumes and important changes or possible trends. Detailed statistical information and definitions of the terms used are presented in an Appendix.

Users of the data in this report are cautioned to read with care the precise definitions of the terms used, the description of the forest-survey methods, and the statements pertaining to the reliability of the estimates.

The TIMBER RESOURCES of NEW HAMPSHIRE

by

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A fine stand of tall, straight eastern white pine in New Hampshire. This stand is seen from State Route 16, north of Lake Chocorua.

Introduction

TEN years ago, the first comprehensive report on the timber resources in New Hampshire was published (U.S. Forest Service 1954)[1]. The information in that report was based upon forest-survey sample plots established in 1946-48, and upon other data. Since then many changes have taken place in the timber resource. To assess these changes and to measure the current timber resource, the forests of New Hampshire were resurveyed recently. In this resurvey some of the original forest-survey plots were remeasured and new forest plots were established.

This is a report on the results of our resurvey. In general, the resurvey showed that the area of commercial forest land in New Hampshire has increased, the volume of standing sawtimber has decreased slightly, and the volume of poletimber has increased considerably.

Just as the area and volume of standing timber changed, significant shifts took place in the timber-products industries. Production of timber products from New Hampshire's forests increased during the period 1947-52; but in 1960 production dropped to about one-half of what it was in 1947. In terms of raw material used, lumber continues to be the leading timber product from the forests. The pulp and paper industry in 1960 used about one-half as much wood as the sawmilling industry. Veneer mills used a considerable volume of high-quality hardwoood logs. The forests also produced wood for turnery bolts, cooperage logs, fuelwood, excelsior, handle stock, charcoal, piling, posts, poles, Christmas trees, and other miscellaneous specialty products.

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[1] See Literature Cited, page 21.

The Wood-Using Industries

Twelve years ago there were many more primary wood-using plants in New Hampshire than there are today. At that time more than 500 sawmills were operating; but in 1962 only 277 sawmills (including part-time or farm mills) were operating (N. H. Forestry and Recreation Commission 1961). Then there were nine shingle and excelsior mills; now there is only one excelsior mill. Then there were two veneer mills, and in 1962 one of those closed down. However, the three pulp mills that were operating in 1948 are still in business.

THE LUMBER INDUSTRY

Sawmills in New Hampshire produced 175,000,000 board feet of lumber in 1960. This is less than two-thirds of the volume of lumber produced 12 years ago. Most of the lumber production is from the sawmills registered as Class I, or commercial sawmills. The volume of hardwood lumber produced each year has remained about the same for many years, but the amount of softwood lumber produced has decreased sharply since 1943 (fig. 1).

White pine has made up about three-fourths of the softwood lumber production in recent years. According to annual sawmill reports to the Forestry and Recreation Commission, the total production of white pine lumber in New Hampshire in 1951 was 248 million board feet. In 1960 the production of white pine lumber dropped to 124 million board feet, a decrease of almost one-half (Baldwin 1961). At the same time, adjusted prices for white pine lumber changed very little. The decrease in production and the relatively stable price situation are attributable to: (1) greater use of substitute materials, (2) the decline of the box industry, and (3) more intensive competition with other softwood-producing areas.

About 35 years ago, 63 percent of New Hampshire's total lumber production was in round-edge material, most of which was manufactured into boxes and shooks. By 1956 this proportion

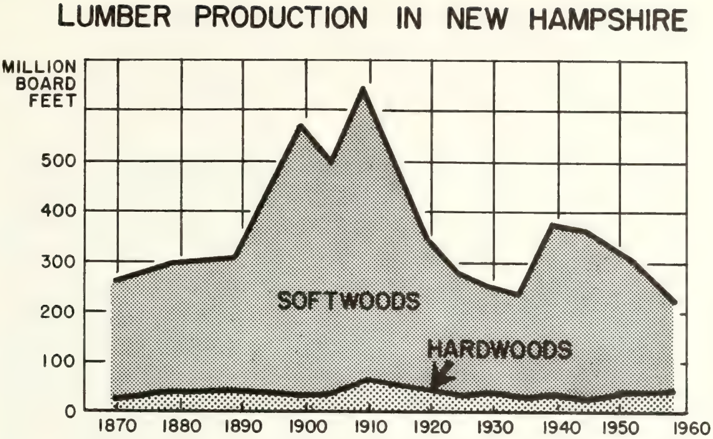

Figure 1. — Production of hardwood lumber has continued at a fairly steady level in New Hampshire, but softwood lumber production has declined sharply in recent years. (Data are from U.S. Dept. Agr. Misc. Pub. 669, 1948.)

had dropped to 43 percent (Wallace and Amidon 1958). According to another survey made in 1959 by Wallace[2] the production of round-edge lumber has dropped to 13 percent. Of the white pine lumber produced, less than 19 percent was round-edged.

Less lumber is being produced by the portable sawmills throughout the State. The shift to larger capacity, permanent-type sawmills with good manufacturing and marketing facilities is a favorable trend for both timberland owners and the lumber industry.

THE PULP AND PAPER INDUSTRY

Pulpwood harvested from the forests of New Hampshire during 1960 amounted to 195,000 cords. Plant residues probably supplied another 30,000 cords. About 40 percent of the pulpwood produced was from hardwood trees. Twelve years previously hardwoods made up 20 percent of the pulpwood.

The use of chips for wood pulp has boomed tremendously in the last 8 to 10 years. Most of this raw material has been mill

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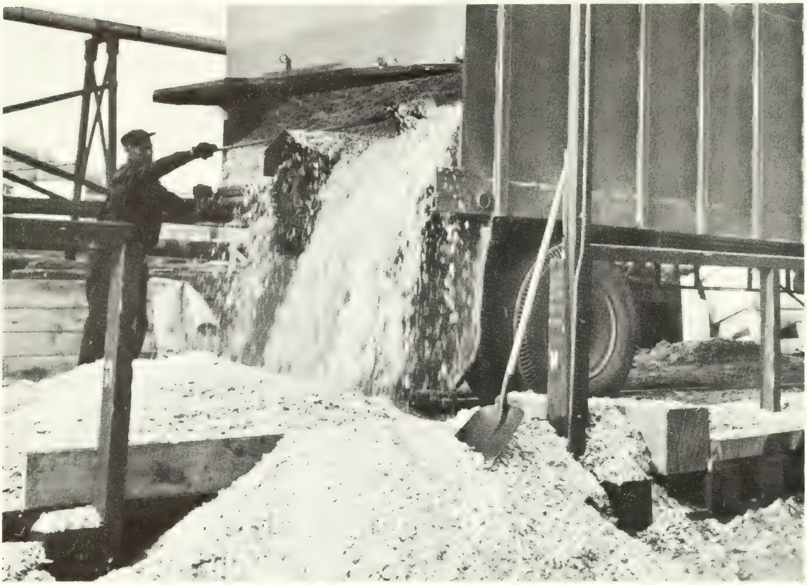
[2] Unpublished report, New Hampshire Agricultural Experiment Station.

Figure 2. — Use of wood chips for wood pulp has increased greatly. Converted mainly from sawmill slabs and edgings, large quantities are delivered to the mill in truck trailers.

PHOTO BY COURTESY OF THE BROWN CO., BERLIN, N. H.



waste—mainly from sawmills (fig. 2). Most of the veneer mill cores were also used for pulpwood. The previous timber-resource report showed that chipped residues made up less than 1 percent of the total pulpwood consumed in 1952. In only 7 years, the volume of chipped residues used jumped to 10 percent of the total.

Another recent trend in the pulp and paper industry in New Hampshire is to purchase pulpwood by weight. This has had little or no effect on timber-utilization standards; possibly a slightly higher proportion of defective material is being marketed. When green wood is bought by weight, 4,600 pounds of softwood or 5,600 pounds of hardwood is considered equivalent to 1 cord.

Although hardwoods made up almost half of the volume of pulpwood used in 1960, hardwood pulpwood is now a glut on the market. At one mill, the delivered price per cord of hardwood pulpwood dropped to a low of about $14 in 1962 as compared with $21 in 1952.

OTHER WOOD-USING INDUSTRIES

Of the total output for all timber products about 15 percent (9,400,000 cubic feet) was produced by mills other than sawmills or pulpmills. Twenty-three registered mills in 1960 used about 3,000,000 cubic feet of wood—more than three-fourths of it hardwood—to produce turnery bolts, veneer (fig. 3), cooperage, box shooks, excelsior, handle stock, and miscellaneous specialty products. Fuelwood accounted for about 6,000,000 more cubic feet, mostly all hardwood. A relatively small amount of roundwood was used for piling, poles, and posts.

According to mills reporting their output to the State, about one-fifth of the turnery bolts, one-third of the cooperage logs and bolts, and more than one-half of the veneer logs and bolts were shipped out of the State.

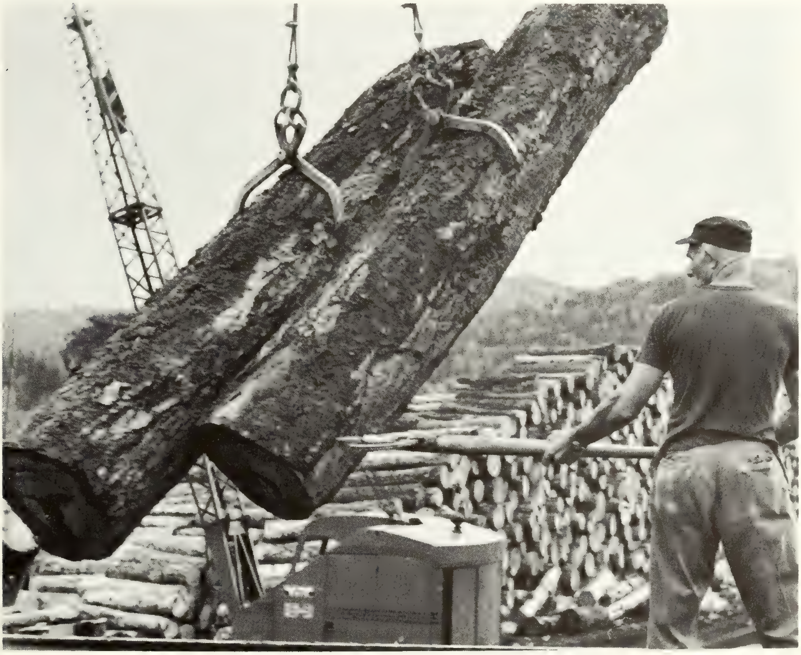


PHOTO BY COURTESY OF THE BROWN CO., BERLIN, N. H.

Figure 3. — The timber resource of New Hampshire provides raw material for a number of other forest products besides lumber and wood pulp. These veneer logs are being moved from vats into a plywood mill.

EMPLOYMENT AND INCOME

Employment in the nonagricultural industries in New Hampshire hit its last low point in 1949 when 169,000 workers were employed (N.H. Dept. of Employment Security 1962). Since then employment has increased rather steadily to 208,000 in 1961, with slight dips during recessions in 1954 and 1958. However, the trend was different for the industries that produce lumber and wood products, furniture and fixtures, and paper and allied products. In 1949 these industries employed 15,000 workers. The number increased to 17,000 workers in 1953, fluctuated in the intervening years, and in 1961 dropped to 14,000 workers.

About 10,000 additional jobs developed in New Hampshire during the last 3 years, the biggest increase in the electrical-products industry. During the same time, employment in the lumber and wood-products industry decreased by 600. And in the paper and allied-products industry employment decreased by 600 workers, too. Twelve years ago, the primary wood-using industries accounted for 9 percent of the nonagricultural industries employment; by 1961 their employment had dropped to 7 percent.

The payroll in 1959 for the 86,000 workers employed in all manufacturing industries in New Hampshire was $312 million. Workers (15,400) in the primary wood-using industries received $63 million, or 20 percent of that total. Payrolls in 1961 for all manufacturing industries increased to $328 million, but corresponding payrolls for lumber and wood products, furniture and fixtures, and paper and allied products industries dropped to $59 million—18 percent of the total for all industries.

The Timber Resource

The nearly 5 million acres of commercial forest land in New Hampshire support almost 5 billion cubic feet of sound wood in live trees. Not all of this is considered to have commercial value. More than one-eighth of the total volume (669,000,000 cubic feet) is in trees of noncommercial species and in trees too rough, too crooked, or too rotten to be merchantable. The other seven-eighths of the sound wood volume make up the timber inventory upon which forest industries depend.

The timber supply for industrial use amounts to 4,315,000,000 cubic feet. This is referred to as *growing stock*[3]. The growing-stock volume is about equally divided between sawtimber trees and poletimber trees, a little more than 2 billion cubic feet in each class, and about equally divided between softwoods and hardwoods.

GROWING STOCK

Growing-stock volume is the sound wood portion of all living trees, to a minimum 4-inch top, including sawtimber-size trees. Over all forest land in New Hampshire, there is an average volume of 880 cubic feet of growing stock per acre. The average volume per acre for sawtimber stands is 1,500 cubic feet; for poletimber stands it is 700 cubic feet; and for other areas it is 100 cubic feet.

White pine makes up 36 percent of the board-foot volume in sawtimber trees. But in terms of growing stock, it makes up only 24 percent. This means that the future board-foot volume of white pine will decrease in relation to total board feet of all species. The board-foot/cubic-foot ratio for other softwood species will remain about the same, and the corresponding ratio for hardwoods will increase.

Cubic-foot volume can be converted to a cordwood equivalent by using the ratio of 80 cubic feet of wood to 1 cord of wood with bark. For example, the 2.4 billion cubic feet of softwoods is equivalent to 30.0 million cords. The average volume per acre of growing stock expressed in cords is 11 cords per acre—6.1 cords of softwoods and 4.9 cords of hardwoods.

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[3] See Appendix for definitions of this term and other terms used in this report.

Not quite all the cubic-foot volume shown for growing stock is suitable for pulpwood. Pulpwood volume specifications exclude bolts too crooked to meet specifications; they also exclude bolts that contain rot. Pulpwood volume also includes usable portions of trees that are classed as sound culls, but not as growing stock. These two factors are somewhat compensating. The total volume suitable for pulpwood amounts to 29.9 million cords of softwoods and 23.6 million cords of hardwoods.

SAWTIMBER VOLUME

In 1960 (the timber-inventory year), the estimated volume of standing sawtimber trees was 8.6 billion board feet, an average of 1,750 board feet per forest acre. More important to those interested in timber production is the volume of sawtimber trees in sawtimber stands. The volume in sawtimber stands totals 6.6 billion board feet, or an average volume of 3,800 board feet per acre. Most of the remaining board-foot volume is in sawtimber trees that are scattered among poletimber and other stands.

About one-fifth of the board-foot volume in sawtimber trees is found on the White Mountain National Forest. The average board-foot volume per acre on National Forest land is almost twice that on commercial forest land outside the National Forest—3,000 board feet per acre as compared to 1,600 board feet.

White pine (and a small amount of red pine) makes up more than one-third of the board-foot volume—3.1 billion board feet. Other softwood species make up about another third (2.6 billion board feet), and hardwoods make up the remaining third (2.9 billion board feet). Most of the sawtimber volume is found in the smaller diameter classes, less than 15.0 inches d.b.h. Two-thirds of the white pine volume and 80 percent of all other softwood volume are in the smaller diameter classes. About 57 percent of the hardwood sawtimber volume is also in the smaller-size trees.

Changes from Previous Survey

From the differences between the data for the two surveys, it is difficult to discern the real changes that have taken place in the forests of New Hampshire. Some of the differences are attributable to sampling accuracy; some of the differences are due to actual changes. Some differences can be explained in relation to other pertinent information such as timber cut and timber growth. Although all differences between the two sets of statistics are not necessarily due to actual changes, they will be given for the major breakdowns of forest-area and timber-volume classes.

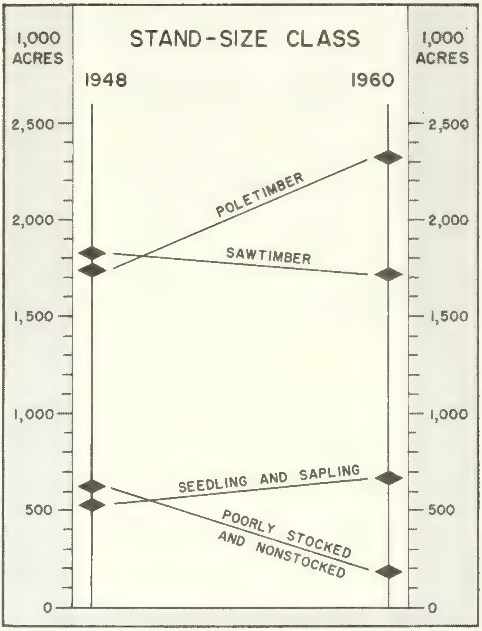
FOREST AREA

The total commercial forest area in the State increased by 225,000 acres in the 12-year period between the two surveys. This increase is due mostly to abandonment of farmland; much of the open pasture and previously cultivated land that became idle is reverting back to forest. Without exception, commercial forest land increased in every county, and now no county in the State has less than 80 percent of its land area in forests, as the following tabulation shows:

County	*Land area (acres)*	*Commercial forest-land area (acres)*	*Commercial forest-land area (percent)*
Belknap	256,000	218,000	85
Carroll	600,300	537,800	90
Cheshire	458,900	394,500	86
Coos	1,166,100	1,002,400	86
Grafton	1,098,200	916,200	83
Hillsborough	569,600	475,100	83
Merrimack	594,600	519,000	87
Rockingham	442,200	352,300	80
Strafford	241,300	200,700	83
Sullivan	343,700	291,400	85
Total	5,770,900	4,907,400	85

The area of sawtimber stands remained about the same. The acreage of poletimber stands that grew into the sawtimber stand

Figure 4. — The changes in acreage of stand-size classes between 1948 and 1960. Poletimber stands increased by more than a third.



class compensated for the acreage that moved out of this class because of timber cutting (fig. 4).

The estimated forest area in poorly stocked stands and nonstocked area is considerably less now than it was in 1948. This estimation illustrates a change that is due mostly to the small number of sample plots used in these classes in both surveys, and their larger sampling errors. The actual area of such stands is probably much larger than the data show. Timber on some of this area increased sufficiently in size and volume to pass into the poletimber-stand classifications. Some of the poletimber and sawtimber stands that were cut reverted back into the poorly stocked and nonstocked classification. Probably thousands of acres of abandoned farmland changed from nonforest to seedling-and-sapling stands and poorly stocked stands. The net effect of these changes in the area of the two combined classes should result in about the same acreage (1,100,000 acres), but in 1960 the combined area was only 850,000 acres. The area that could be planted (poorly stocked stands and nonstocked areas) now exceeds 200,000 acres.

The resurvey shows a considerably different distribution of acreages in the major forest types, except for the white pine forest cover type (fig. 5). The maple-beech-yellow birch forest cover type has decreased in area. This is partially substantiated by a decrease in the inventory volume of yellow birch and sugar maple, but the decrease is probably not so great as shown. The area of the spruce-fir cover type shows a sharp increase. This too is probably due in part to a large sampling error as well as to a real difference. Some increase is substantiated by an increase in the volume of spruce and fir. No effort was made to show any change of area on the forest-type map (see page 45) that was made in 1947.

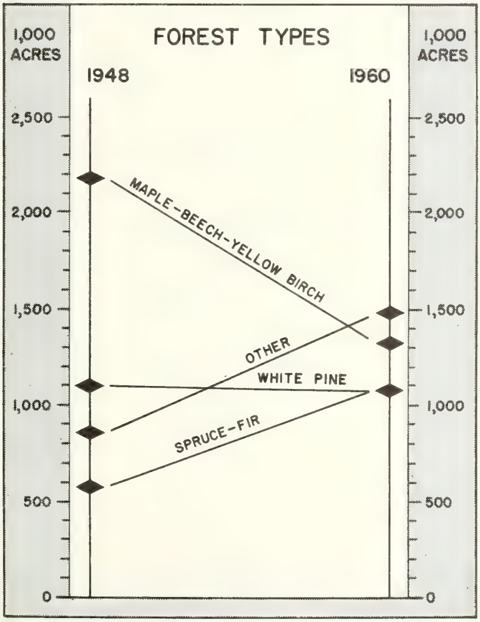


Figure 5. — The changes in distribution of forest types between 1949 and 1960. Considerable changes occurred, except for the white pine type.

The average growing-stock volume per acre for all commercial forest land in New Hampshire increased by 60 cubic feet in 12 years to an average of 880 cubic feet per acre. During the same period, the average sawtimber volume per acre decreased by 325 board feet to an average of 1,750 board feet per acre.

DISTRIBUTION OF TIMBER VOLUME

In 1948, slightly more than one-half of the board-foot volume (5.1 billion board feet) was in sawtimber trees of less than 15.0 inches d.b.h. By 1960, two-thirds of the board-foot volume was in this size group. The volume of trees in the 14-inch d.b.h. class changed only slightly during the 12-year period (fig. 6). Volumes in the larger diameter classes decreased, with the sharpest decrease in the 20-inch d.b.h. and larger tree class. The sharpest increase was for softwoods that make up the 10-inch d.h.h. class (not shown in figure); the volume for this class increased from 1.2 billion to 1.8 billion board feet.

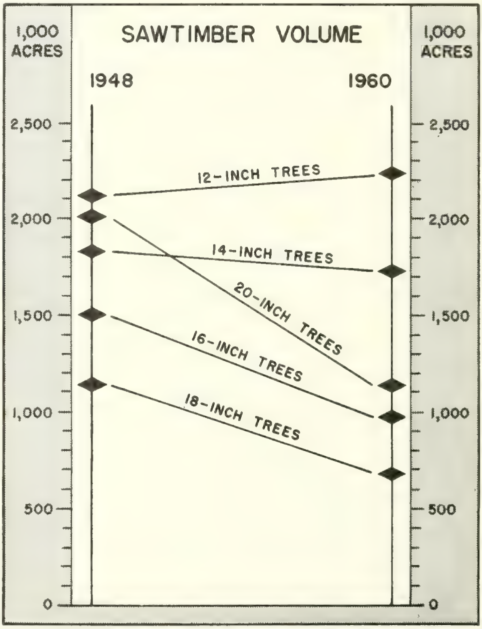


Figure 6. — The changes in sawtimber volume between 1948 and 1960. Volumes in the larger diameter classes decreased.

The cubic-foot volume relationship between poletimber trees and sawtimber trees changed comparatively little. In 1948 poletimber trees made up 48 percent of the growing-stock volume, and in 1960 they made up 51 percent of the total. Now, as it was in 1948, less of the softwood volume was in poletimber trees, and more of the hardwood volume was in poletimber.

ERRATA

In Figure 6 on page 12, showing changes in sawtimber volume, the units of measure should be million board feet rather than 1,000 acres.

the board foot volume

SPECIES COMPOSITION

White and red pine sawtimber volume decreased slightly, from 3.2 billion to 3.1 billion board feet (fig. 7). The estimated volume of hemlock decreased more sharply, from 1.2 billion board feet to less than 1 billion board feet, reflecting increased demand for this species. Spruce and fir now make up a correspondingly larger percentage of sawtimber volume. All together there was an apparent decrease of about 250 million board feet of softwood sawtimber in 1960.

Sugar maple and yellow birch made up slightly more than half the sawtimber volume of hardwood species in 1948. These two species show a sharp decrease in volume—from 2.0 billion to 1.3 billion board feet (fig. 8). Increased cutting and mortality of the larger and better quality yellow birch trees—and sampling errors—can account for much of the decrease. For example, the estimated volume of yellow birch cut was about 15 million board feet in 1948. In 1959 two to three times as much volume of yellow

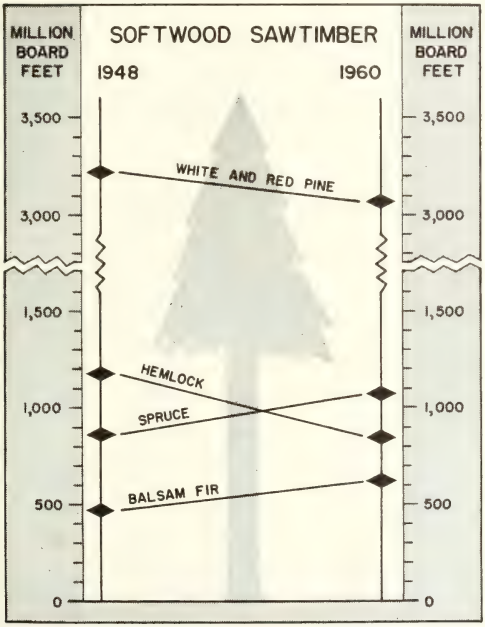
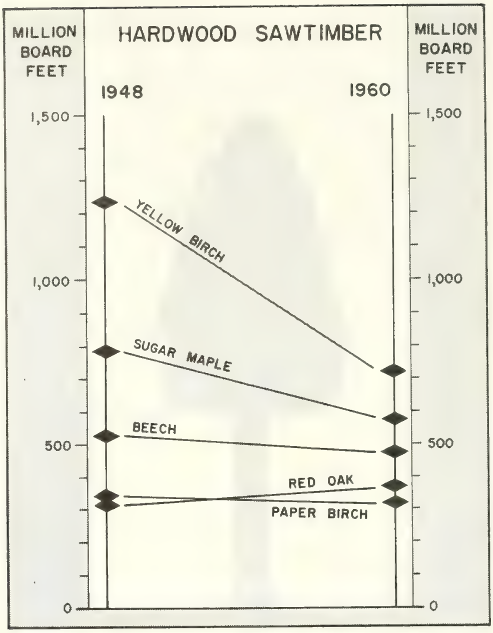


Figure 7.—The changes in softwood sawtimber volume between 1948 and 1960. Spruce and fir gained in volume.

Figure 8. — The changes in hardwood sawtimber volume between 1948 and 1960. The decrease in yellow birch is due partly to increased cutting of the larger and better trees.



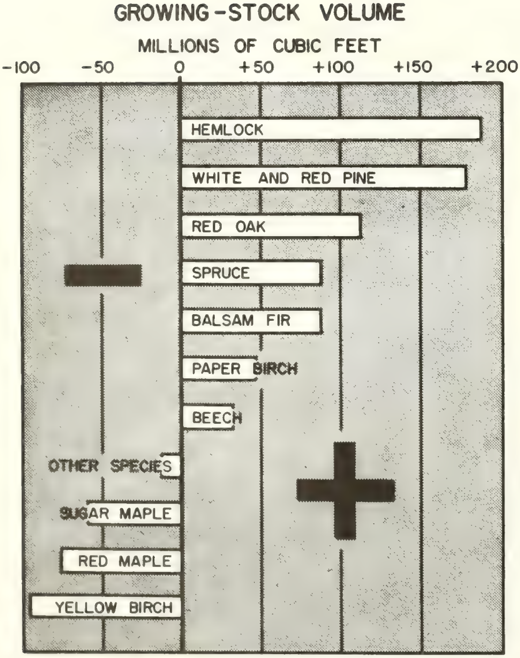


Figure 9.—The changes in growing-stock volume between 1948 and 1960, by species.

birch was being cut. Beech, paper birch, and red maple decreased somewhat in volume. Red oak and the other hardwood species showed an increase in board-foot volume.

Growing-stock volume changes among species were considerably different from the board-foot volume changes. Hemlock, white pine, paper birch, and beech showed decreases in board-foot volume, but increases in cubic-foot volume (fig. 9)—due mostly to the increase in poletimber volume.

TIMBER QUALITY

Trees that make up a forest stand can be grouped into two broad classes: growing stock and other material. This other-material class includes trees of noncommercial species such as hophornbeam and pin cherry, trees that have too much rot, and trees that are sound but will not produce sawlogs that will meet grade specifications.[4] Trees that make up this class are generally referred to as rotten-cull and sound-cull trees. They made up 13 percent of the sound wood volume in all live trees in both 1948 and 1960.

The quality of sawtimber is not so good as it was. The larger trees, which contain the highest proportion of Grade 1 lumber logs, have been heavily cut. For example, there were 1.0 billion board feet in softwood trees 19.0 inches d.b.h. and larger in 1948, but by 1960 the volume in this class had dropped to 0.6 billion board feet. Yellow birch and sugar maple, which make up about half of the hardwood sawtimber volume, had 760 million board feet in trees larger than 19.0 inches d.b.h. in 1948, and this volume had dropped to 370 million board feet by 1960.

According to log-grade specifications, all softwood and most hardwood sawlogs must have a minimum small-end diameter of 13.0 inches to be considered for a Grade 1 log. Any tree that contains such a sawlog is almost without exception at least 15 inches d.b.h. The board-foot volume of trees 15.0 inches d.b.h. and larger (16-inch class) made up 48 percent of the total volume in 1948, but the volume of trees in this group decreased to 33 percent of the total by 1960 (fig. 6).

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[4] For log-grade specifications, see Appendix.

OWNERSHIP

The largest single ownership in New Hampshire is the White Mountain National Forest, which administers 569,000 acres of commercial forest land. This land is almost 12 percent of the total in the State (fig. 10). Other Federally owned forest land amounts to 10,000 acres.

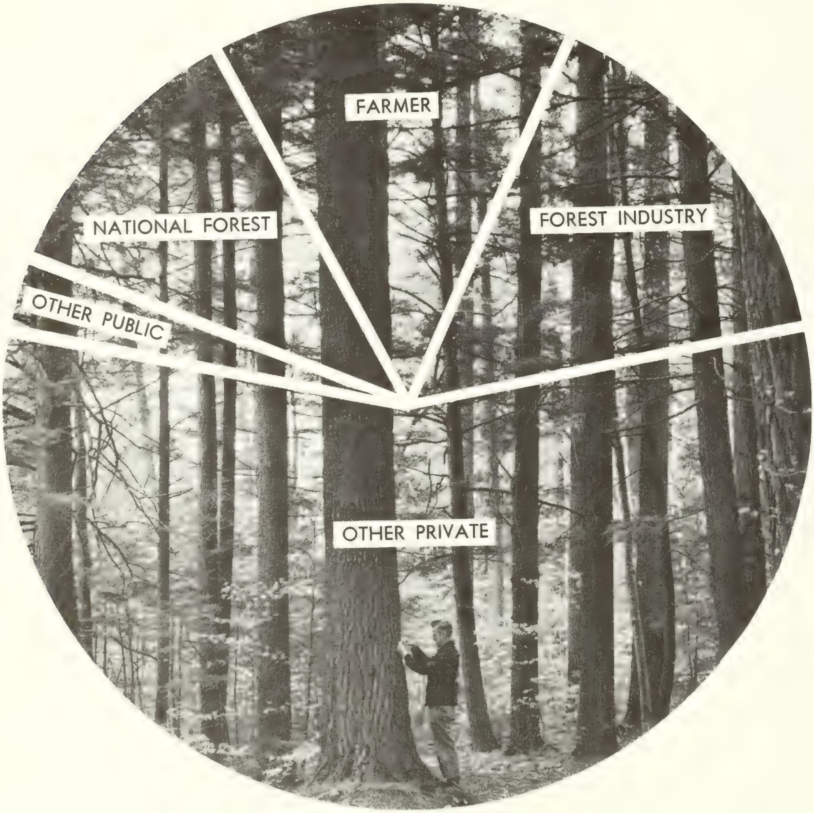
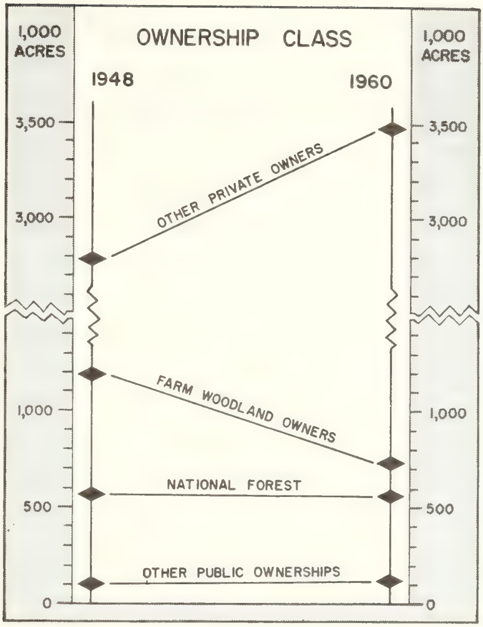


Figure 10. — The distribution of commercial forest land in New Hampshire in 1960, according to ownership.

Forest-industry holdings make up 16 percent of the commercial forest land (793,000 acres), mostly concentrated in nine ownerships of more than 25,000 acres each.

Figure 11.—The changes in distribution of forest area among ownership classes between 1948 and 1960.



Scattered throughout the State are 142 State forests and State parks that have a gross (both forest and nonforest) area of 64,000 acres. Other State-owned areas amount to 20,000 acres. About 66,000 acres of all State-owned land is commercial forest. County and municipally owned commercial forest land totals 52,000 acres.

Farm woodland, as reported by the Bureau of the Census (U. S. Bureau of Census 1959), amounts to 725,000 acres.

The bulk of the commercial forest land in New Hampshire (2.7 million acres) is owned by people who have holdings of less than 5,000 acres each. These are the businessmen, tradesmen, laborers, clerks, professional people, and summer residents—all together about 35,000 of them.

Changes in the forest-land-ownership pattern show a sharp drop of 315,000 acres in farm woodland since 1948 (fig. 11). Other private owners of commercial forest land increased their holdings by 514,000 acres. The acreages in National Forest and other public ownerships in 1960 remained about the same.

Annual Growth of the Timber Supply

Net annual growth (see definition in the Appendix) is more easily understood through a description of its component parts. Components of the net annual growth are: (1) the increment in net volume (that is, after allowances for defect) of trees at the beginning of a specified year and surviving to its end (*survivor growth*), plus (2) the increment in net volume of trees at the beginning of the year that were cut or died during the year *(cut-tree or dead-tree growth)*, plus (3) the net volume of trees that grew into growing stock (or sawtimber) during a specified year *(ingrowth)*, minus (4) the net volume of trees that died from natural causes during the specified year *(mortality)*, and minus (5) the net volume of trees that became cull trees during the year *(degrade)*.

Estimates of net annual growth for previous forest-survey reports were based upon rates of growth that were determined from (1) increment cores extracted from sample trees and (2) the tally of merchantable, cull, and dead trees on the sample plots. The estimates in this report are based upon remeasured sample plots that were established 10 to 11 years previously. These remeasurements, we believe, give us better estimates for ingrowth and mortality as well as net annual growth.

Net annual growth of sawtimber is 252,000,000 board feet, an average of 51 board feet per acre per year, for all commercial forest land. Sawtimber stands (considered separately) would average more than 100 board feet of annual growth per acre.

Growing stock on the average acre of commercial forest land in New Hampshire is growing at the rate of 31 cubic feet a year. But mortality claims 7 cubic feet each year, which leaves a net annual growth of 24 cubic feet. The average net annual growth for sawtimber and poletimber areas combined would amount to about 30 cubic feet per acre, a little less than ½ cord per acre per year.

Board-foot growth estimates for 1952 were evidently much too high. Growth rates from increment cores resulted in an estimate of 101 board feet per acre per year for all commercial forest land, almost double the present estimate. The breakdown of net annual growth into softwoods and hardwoods shows considerable differences between the proportions. In 1952, softwoods were estimated to make up 55 percent of the total board-foot growth, but in 1959 softwoods made up 73 percent of the total.

The previous report showed a substantial excess of timber growth over timber cut in both sawtimber and growing-stock volume. However, in 1960 the board-foot volume of sawtimber that was cut was approximately in balance with the net annual board-foot growth. The decline of white pine sawtimber volume cut has brought about an approximate balance between softwood board-foot net annual growth and the annual cut. Obviously a balance is not an end in itself but an indication of the present status as compared to a predetermined goal. The citizens of New Hampshire, and of the Nation, set the goals.

An Opportunity

New Hampshire is one of the most extensively forested states in the country—87 percent of its land area supports some kind of forest cover. Most of the wood volume is in timber stands that are relatively young. As a result, total volume is increasing faster than timber is being cut.

By 1960, lumber production in New Hampshire had dropped to 175 million board feet. However, by 1975 production could rise to 350 million board feet if New Hampshire continues to produce its share of lumber and other products.

If production of timber in New Hampshire is to be increased, both the challenge and the opportunity for expansion of the forest industries are great. One approach to these opportunities is given in a recent research study, conducted under the direction of the New Hampshire State Planning and Development Commission (Stoddard and House 1961). This study offers suggestions for expansion and improvement of the forest-resource industries and for improving the production of timber on small ownerships.

Future trends in New Hampshire's production of timber products will be heavily influenced by competition with other softwood-producing areas, especially the West Coast. Industrial changes in the direction of larger mills and better equipment might be helpful in meeting this competition. Some changes are occurring; several large and well-equipped mills have been installed during the past 10 years.

However, industrial changes are occurring slowly. Aggregate data show that average production per sawmill has *not* increased during the period 1946-60 despite a 40-percent drop in the number of mills.[5] Will this transformation of the New Hampshire lumber industry go forward more rapidly? The answer will come from sawmill owners and operators and their technical and business advisors.

The decision to take up the challenge and to capitalize on the opportunity lies with the State of New Hampshire and its citizens.

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Appendix

DEFINITIONS OF TERMS

Forest Area

Forest land area.—This includes: (a) lands that are at least 10 percent stocked with trees of any size and are capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10-percent stocking and that has not been developed for other use; and (c) afforested areas. (Forest tracts of less than 1 acre, isolated strips of timber less than 120 feet wide, and abandoned fields and pastures not yet 10-percent stocked with trees are excluded).

Commercial forest land area.—Forest land that is (a) producing, or physically capable of producing, usable crops of wood (usually sawtimber); (b) economically available now or prospectively; and (c) not withdrawn from timber utilization through statute, ordinance, or administrative order.

Noncommercial forest land area.—Forest land that is (a) withdrawn from timber utilization through statute, ordinance, or administrative order, but that otherwise qualifies as commercial forest land; or (b) incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions, or so physically inaccessible as to be unavailable economically in the foreseeable future.

Forest Cover Types

The forest cover types are classified according to the predominant species or species group, as indicated by cubic volume for sawtimber and poletimber stands, and number of trees for seedling-and-sapling stands. All local forest cover types in New Hampshire are keyed to the following four major types:

White pine-red pine.—Forests in which 50 percent or more of the stand is eastern white pine or red pine, singly or in combination. In New Hampshire it includes the white pine and hemlock types. A negligible acreage of the pitch pine type is also included.

Spruce-fir.—Forests in which 50 percent or more of the stand is spruce and fir. In New Hampshire it includes the spruce-fir, spruce-fir-hardwood, and cedar-tamarack-spruce types.

Maple-beech-birch.—Forests in which 50 percent or more of the stand is sugar maple, beech, or yellow birch, singly or in combination. In New Hampshire it includes the sugar maple-beech-yellow birch, hardwood-spruce-fir, and hardwood-white pine types. A small acreage of the oak and the ash-elm-maple types is also included.

Aspen-birch.—Forests in which 50 percent or more of the stand is aspen, paper birch, or gray birch, singly or in combination. In New Hampshire it includes the aspen, gray birch-pin cherry, and paper birch types.

Class of Timber

Sawtimber trees.—Trees of commercial species that: (a) are of the following minimum diameters at breast height—softwoods 9.0 inches and hardwoods 11.0 inches; (b) contain at least one merchantable sawlog; and (c) contain at least 50 percent sound volume in the sawlog portion of the tree. (A merchantable sawlog is a portion of a live tree that meets the minimum log-grade specifications, as defined under log-grade classification. The sawlog portion is that part of the tree between the stump and the top of the last merchantable sawlog.)

Poletimber trees.—Trees of commercial species that meet regional specifications of soundness and form, and are of the following diameters at breast height; softwoods 5.0 to 9.0 inches; hardwoods 5.0 to 11.0 inches. Such trees will usually become sawtimber trees if left to grow.

Seedling-and-sapling trees.—Trees of commercial species less than 5.0 inches in diameter at breast height and of good form and vigor.

Cull trees.—Live trees of sawtimber or poletimber size that are unmerchantable for sawlogs now or prospectively because of defect or rot, or because they are of undesirable species.

Pulpwood trees.—Live trees of commercial species, 5.0 inches d.b.h. and larger, including sawtimber, poletimber, and even cull trees that contain at least two contiguous pulpwood bolts and of which 50 percent or more of the main-stem volume is usable for pulpwood.

Stand-Size Classes

Sawtimber stands.—Stands with sawtimber trees having a minimum net volume per acre of 1,500 board feet, International ¼-inch rule.

Poletimber stands.—Stands that fail to meet the sawtimber-stand specification, but that are at least 10 percent stocked with poletimber and larger trees (5.0 inches d.b.h. and larger), and have at least one-half the minimum stocking in poletimber trees. Poletimber stands carry at least 200 cubic feet per acre.

Seedling-and-sapling stands.—Stands that do not qualify as either sawtimber or poletimber stands, but have at least 10 percent stocking of trees of commercial species, and have at least one-half the minimum stocking in seedling-and-sapling trees.

Nonstocked areas.—Areas that do not qualify as sawtimber, poletimber, or seedling-and-sapling stands; areas less than 10 percent stocked with trees of commercial species.

Timber Volume

Growing stock.—Net volume, in cubic feet, of live sawtimber trees and live poletimber trees from stump to a minimum 4-inch top (of central stem) inside bark. Net volume = gross volume less deduction for rot.

Live sawtimber volume.—Net volume in board feet, International ¼-inch rule, of merchantable sawlogs in live sawtimber trees of commercial species. Net volume = gross volume in terms of the International ¼-inch rule less deduction for rot, sweep, and other defects that affect use for lumber.

Pulpwood volume.—Net volume in standard cords (including bark) of all trees that meet pulpwood tree specifications, regardless of whether

WHITE PINE AND RED PINE LOGS

Grade	*D.i.b. small end (inches)*	*Length w/o trim (feet)*	*Total* deduction permitted*	*Surface requirements*
1	13+	8+	None	Surface clear 100%.
	13-16	12-16	25%	Must be ⅔ surface clear in lengths 8′ long or longer; or 50% surface clear full length.
	17+	10-16	30%	Must be ½ surface clear in lengths 8′ long or longer; or 25% surface clear full length.
2				All knots for Grade 2 logs must be sound and tight.
	9-16	10+	30%	Knots not over 2.5″ in diameter. Larger knots permitted only if 50% full length surface with knots not larger than 2.0″ in diameter.
	17+	8+	40%	Knots not over 3.0″ in diameter. Larger knots permitted only if 50% full length surface with knots not larger than 2.5″ in diameter.
3	6-7	8+	25%	Sound knots not over 1″ in diameter; or live knots not over 2.0″ in diameter.
	8-13	8+	30%	No surface requirements, except logs with knots 4″ or more in diameter in whorls less than 2′ apart will not be accepted unless 25% or more full length surface with sound knots not over 2″ in diameter.
	14+	8+	40%	No surface requirements, except that knots over 6″ in diameter cannot be closer than 3′ apart.

* Total deduction includes sweep, rot, and other cull.

Figure 12. — The timber-grading specifications used in the forest survey of New Hampshire for white and red pine lumber logs.

or not these trees also meet sawtimber specifications. It includes the main stem from the stump to the point where the top breaks up into branches, or to a minimum top diameter of 4.0 inches (inside bark). Deductions are made for all portions of the stem that fail to meet pulpwood bolt requirements. The standard cord is a unit of measure for stacked wood, encompassing 128 cubic feet of wood, bark, and air space. Cord estimates are derived from cubic-foot measurements by applying a factor of 80 cubic feet of wood (inside bark) per rough cord.

HARDWOOD FACTORY LOGS

*Grade Factors**		*Specifications*							
		Log grade 1			*Log grade 2*				*Log grade 3*
Position in tree		Butts only	Butts & uppers		Butts & uppers				Butts & uppers
Minimum diameter (inches)		[1] 13-15	16-19	20+	[2] 11	12+			8+
Minimum length (feet)		10+	10+	10+	10+	8-9	10-11	12+	8+
Clear** cuttings on each of the 3 best faces	Min. length (feet)	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	—
	Min. yield, face length	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Max. sweep and crook allowance; % of gr. vol.		15			30				50
Max. cull and sweep allowance; % of gr. vol.		[3] 40			[4] 50				50

*End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in U.S. Forest Prod. Lab. Rpt. D1737.

**A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.

[1] Ash and Basswood butts can be 12 inches if otherwise meeting the requirements for small No. 1's.

[2] 10-inch logs of all species can be No. 2 if otherwise meeting the requirements for small No. 1's.

[3] Otherwise No. 1 logs with 51-60 percent cull can be No. 2.

[4] Otherwise No. 2 logs with 51-60 percent cull can be No. 3.

Figure 13.—Hardwood timber-grading specifications for factory lumber logs, based on U.S. Forest Products Laboratory studies.

Product Specifications

The product specifications used in the forest survey for hardwood lumber logs, hardwood tie and timber logs, and white pine lumber logs are shown in figures 12, 13, and 14. Product specifications for pulpwood bolts are given below:

Pulpwood bolt.—A pulpwood bolt is a 4-foot section of the main stem of any commercial species tree 5.0 inches d.b.h. and larger; 4.0 inches or larger inside bark at the small end; free from any indication of rot, charred

HARDWOOD TIE AND LUMBER LOGS

Grade Factors		*Specifications*
Position in tree		Butts and uppers
Scaling diameter (inches)		8+
Length, without trim (feet)		8+
Clear cuttings		No requirements. Not graded on cutting basis.
Max. sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar* diameter that is more than one-third of log diameter at point of occurrence.
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound** surface defects permitted		Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.

*Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

**Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

Figure 14. — Timber - grading specifications used for hardwood construction timber.

wood, or hollow center; and contiguous to one or more other bolts that meet the same requirements. Crotches are excluded; sweep or crook in any section shall exclude the bolt if a line from the center of the top end to the center of the bottom end passes outside the wood at any point.

Annual Growth and Cut

Net annual growth of sawtimber.—The change (resulting from natural causes) in net board-foot volume of live sawtimber on commercial forest land during a specified year.

Ingrowth of sawtimber.—The net board-foot volume of trees that first became sawtimber trees during the inventory year, as measured at the end of the year.

Annual mortality of sawtimber.—The net board-foot volume removed yearly from live sawtimber on commercial forest land through death from natural causes.

Net annual growth of growing stock.—The yearly change (resulting from natural causes) in net cubic-foot volume of growing stock on commercial forest land.

Ingrowth of growing stock.—The total net cubic-foot volume of trees that first become a part of growing stock during the inventory year, as measured at the end of the year.

Annual mortality of growing stock.—The net cubic-foot volume removed from growing stock during a year through death from natural causes.

Annual cut of live sawtimber.—The net board-foot volume of live sawtimber trees cut or killed by logging, land-clearing, or cultural operations on commercial forest land during a year.

Annual cut of growing stock.—The net cubic-foot volume of live sawtimber and poletimber trees cut or killed by logging, land-clearing, or cultural operations on commercial forest land during a year.

FOREST-SURVEY METHODS

Our estimates of forest area, timber volume, and annual growth are based upon information obtained from two sets of data. The first set of estimates was from aerial photographs taken before 1948 and from sample plots examined on the ground. Photo plots were pin-pointed on aerial photographs and distributed uniformly over the entire State. Each photo plot was classified as either forest or nonforest, and each forest plot was classified further according to volume-per-acre classes.

Field crews then inspected many of the photo plots on the ground. Enough plots were selected at random to attain specified levels of sampling accuracy. Species, volume, and growth data were gathered on these ground plots. This set of data provided the statistics for the report *The Forest Resources of New Hampshire,* published in 1954.

More than 100 of those ground plots were revisited in 1956 and 1959. Plot centers were relocated, and a new tally of trees was made. The two tallies for each plot were reconciled with one another. This provided the means of obtaining the first part of the estimate of current timber volume and of obtaining a more reliable estimate of timber growth and mortality. Regression equations calculated from the remeasured plots were used to bring up to date the initial estimates of timber volume.

The second part of the estimate of forest area and timber volume was determined from aerial photographs taken between 1952 and 1955. Photo plots were put on these photographs, and each plot was classified as forest or nonforest. Forest plots were classified further according to cubic-foot volume classes. More than 450 new plots were selected at random within each cubic-foot volume class to attain specified levels of sampling accuracy.

The current estimates of forest area and timber volume used in this report were obtained by combining the first and second parts of the new estimates, weighted by their variance reciprocals.

Net annual timber growth was computed solely from the remeasured plots. New plot volume minus old plot volume of uncut plots equals gross growth for the number of years between measurements. Partially cut plots were also used with adjustments for growth on trees until they were cut. Data were summarized by species or species group and were converted from periodic growth to net annual growth.

Estimates of timber cut in New Hampshire were based upon production surveys made in cooperation with the New Hampshire Forestry and Recreation Commission, and wood-utilization studies made by the Northeastern Forest Experiment Station. The production surveys provided estimates of the output of all timber products. From studies conducted on various logging operations, estimates of logging residues were developed, which, when added to the volume of timber products, gave estimates of timber cut.

Sampling errors of breakdowns of commercial forest area in New Hampshire can be approximated from the relationship shown in the graph below (fig. 15). The steps are:

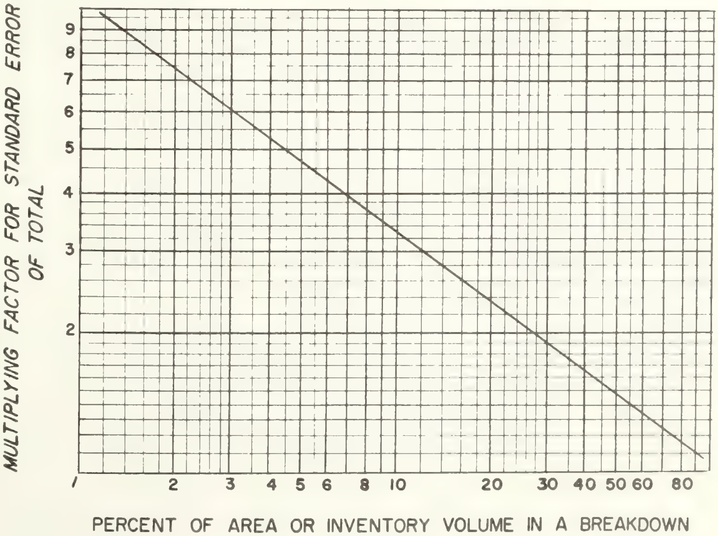

Figure 15. — The ratio of standard error of an area or volume breakdown to standard error of an area or volume total.

1. Compute the percentage that the breakdown contributes to the total (for example, the area of sawtimber stands is 36 percent of the total commercial forest area: 1,746,600 ÷ 4,907,400 = 0.3558).

2. Read from the graph the corresponding factor (for above example it would be about 1.8).

3. Multiply the sampling error of the total by the factor. This product is the approximate sampling error of the breakdown (for above example, the area of sawtimber stands would have a sampling error of about 3 percent: 1.6 x 1.8 = 2.88).

Sampling errors of breakdowns of timber volume also can be approximated by use of the same graph.

RELIABILITY OF THE ESTIMATES

The forest-area and timber-volume data presented in this report are based on a carefully designed sample of forest conditions throughout New Hampshire. However, since not every tree in the State was measured, the figures in this report are only estimates. A measure of the reliability of these estimates is given by the statistical sampling error. Each estimate in this report has a sampling error that could be computed, although only a few were computed.

Briefly, here is the way the sampling error indicates reliability. Our report of the total commercial forest area in New Hampshire, 4,907,000 acres, has an associated sampling error of 1.6 percent (79,000 acres). This means that our best estimate of the commercial forest area in New Hampshire in 1960 is 4,907,000 acres. And if there are no errors in procedure, the odds are 2 to 1 that, if we repeated the 1960 resurvey, the new estimate of commercial forest area would be between 4,986,000 and 4,828,000 acres (4,907,000 ± 79,000). Similarly, the odds are 19 to 1 that it would be within 2 x 79,000 acres of the present estimate, and 300 to 1 that it would be within 227,000 acres of the present estimate.

The computed sampling error is not a complete measure of reliability; there are other sources of error that this term does not include. There could be imperfections in the volume tables used, and there could be errors in field measurement. However, the best volume tables available were used, and procedural errors were kept to a minimum by careful training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Computed sampling errors for the totals shown in this report are as follows:

	Sampling error (percent)
Commercial forest area (4,907,400 acres)	1.6
Growing-stock volume (4,314,600,000 cubic feet)	3.4
Sawtimber volume (8,588,400,000 board feet)	5.3
Net annual growth (118,000,000 cubic feet)	6.6
Annual timber cut (66,000,000 cubic feet)	7.0

All breakdowns of commercial forest area in New Hampshire that are under 25,000 acres have approximate sampling errors greater than 25 percent. Similarly, all breakdowns of inventory volume that are less than 430,000,000 board feet or 220,000,000 cubic feet have approximate sampling errors greater than 25 percent.

SPECIES TALLIED

Only the tree species[6] found on forest survey sample plots in New Hampshire are listed below. Other species that are found in New Hampshire are not included.

Softwoods

Eastern white pine	*Pinus strobus*
Red pine	*Pinus resinosa*
Red spruce	*Picea rubens*
White spruce	*Picea glauca*
Black spruce	*Picea mariana*
Eastern hemlock	*Tsuga canadensis*
Balsam fir	*Abies balsamea*
Other eastern softwoods:	
Pitch pine	*Pinus rigida*
Tamarack	*Larix laricina*
Northern white-cedar	*Thuja occidentalis*
Atlantic white-cedar	*Chamaecyparis thyoides*
Eastern redcedar	*Juniperus virginiana*

Hardwoods

Yellow birch	*Betula alleghaniensis*
Sugar maple	*Acer saccharum*
American beech	*Fagus grandifolia*
Northern red oak	*Quercus rubra*
Red maple	*Acer rubrum*
Paper birch	*Betula papyrifera*
Elm	*Ulmus* spp.
Ash	*Fraxinus* spp.
Aspen	*Populus* spp.
Other eastern hardwoods:	
White oak	*Quercus alba*
American basswood	*Tilia americana*
Hickory	*Carya* spp.
Butternut	*Juglans cinerea*
Black willow	*Salix nigra*
Sweet birch	*Betula lenta*
Black cherry	*Prunus serotina*

NATIONAL STANDARD TABLES

To facilitate compilation of Forest Survey data for any group of States, region, or the Nation as a whole, a standard set of tables is presented in the timber resource report for each State. These tables are presented in the same sequence as those in other timber resource reports, but they do not necessarily have the same table number. The tables contain information on forest area, ownership, timber volume, timber growth, and timber cut. The following tables present this information for the State of New Hampshire:

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[6] Little, Elbert L. Jr. CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). U.S. Dept. Agr. Handb. 41, 472 pp., 1953.

Table 1. — *Area by land classes, New Hampshire, 1960*

Land class	Area	
	Acres	*Percent*
Commercial forest land	4,907,400	85
Unproductive forest land	88,400	2
Productive-reserved forest land	23,500	(1)
Total forest land	5,019,300	87
Nonforest land [2]	749,700	13
All land [3]	5,769,000	100

[1] Less than 1 percent.

[2] Includes 33,000 acres of water according to Survey standards of area classification but defined by Bureau of the Census as land.

[3] From U.S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 2. — *Area of commercial forest land, by ownership classes, New Hampshire, 1960*

Ownership class	Area	
	Acres	*Percent*
National Forest [1]	569,000	12
Other Federal	9,600	(2)
State	65,700	1
County and municipal	52,300	1
Forest industry	793,000	16
Farmer-owned [3]	724,800	15
Miscellaneous private	2,693,000	55
All ownerships	4,907,400	100

[1] Includes both operable (217,000 acres) and inoperable (352,000 acres) areas.

[2] Less than 1 percent.

[3] Census of Agriculture, 1959.

Table 3. — *Area of commercial forest land, in acres, by stand-size and ownership classes, New Hampshire, 1960*

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and misc. private
Sawtimber stands	1,746,600	342,000	44,600	268,500	1,091,500
Poletimber stands	2,316,200	131,000	59,800	397,700	1,727,700
Seedling-and-sapling stands	677,500	96,000	17,900	93,500	470,100
Nonstocked areas	167,100	(1)	5,300	33,300	128,500
All classes	4,907,400	569,000	127,600	793,000	3,417,800

[1] Negligible.

Table 4.—*Area of commercial forest land, in acres, by stand-volume classes for sawtimber and other stand-size classes, New Hampshire, 1960*

Stand volumes per acre [1]	All stands	Sawtimber stands	Other stands
Less than 1,500 board feet	3,160,800	—	3,160,800
1,500 to 5,000 board feet	1,397,000	1,397,000	—
More than 5,000 board feet	349,600	349,600	—
All classes	4,907,400	1,746,600	3,160,800

[1] Net volume, International 1/4-inch rule.

Table 5. — *Area of commercial forest land, in acres, by forest types and ownership classes, New Hampshire, 1960*

Type	All ownerships	Public ownerships	Private ownerships
White-red-jack pine:			
White pine-hardwood	466,400	8,600	457,800
White pine	594,700	—	594,700
Hemlock	324,700	—	324,700
Total	1,385,800	8,600	1,377,200
Spruce-fir:			
Spruce-fir	416,200	112,600	303,600
Spruce-fir-hardwood	639,200	242,400	396,800
Total	1,055,400	355,000	700,400
Oak-hickory:			
Oak-white pine	308,100	—	308,100
White oak	87,800	—	87,800
Red oak	207,100	—	207,100
Total	603,000	—	603,000
Maple-beech-birch:			
Northern hardwood-white pine	178,600	—	178,600
Sugar maple-beech-yellow birch	963,100	297,500	665,600
Hardwood-spruce-fir	159,700	—	159,700
Total	1,301,400	297,500	1,003,900
Aspen-birch:			
Aspen	76,500	—	76,500
Gray birch-pin cherry	128,700	—	128,700
Paper birch	153,000	35,500	117,500
Red maple	84,800	—	84,800
Total	443,000	35,500	407,500
Ash-elm-maple	118,800	—	118,800
All types	4,907,400	696,600	4,210,800

Table 6. — *Area of noncommercial forest land, in acres, by forest types, New Hampshire, 1960*

Type	All areas	Productive reserved areas	Unproductive areas
Spruce-fir	72,400	—	72,400
Spruce-fir-hardwood	39,500	23,500	16,000
All types	111,900	23,500	88,400

Table 7. — *Number of growing-stock trees on commercial forest land, by diameter classes and by softwoods and hardwoods, New Hampshire, 1960*

(In thousands of trees)

D.b.h. class (inches)	All species	Softwoods	Hardwoods
1.0-2.9	2,197,900	783,300	1,414,600
3.0-4.9	890,000	463,900	426,100
5.0-6.9	341,500	165,400	176,100
7.0-8.9	192,900	100,700	92,200
9.0-10.9	81,900	45,700	36,200
11.0-12.9	36,200	21,100	15,100
13.0-14.9	19,600	11,100	8,500
15.0-16.9	8,100	4,400	3,700
17.0-18.9	3,900	2,300	1,600
19.0-28.9	4,200	2,500	1,700
29.0-38.9	100	—	100
All classes	3,776,300	1,600,400	2,175,900

Table 8. — *Volume of timber on commercial forest land, by class of timber and by softwoods and hardwoods, New Hampshire, 1960*

(In thousands of cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Sawlog portion	1,843,800	1,291,300	552,500
Upper-stem portion	260,700	152,800	107,900
Total	2,104,500	1,444,100	660,400
Poletimber trees	2,210,100	955,100	1,255,000
All growing-stock trees	4,314,600	2,399,200	1,915,400
Sound cull trees:			
Sawtimber-size trees	272,600	235,000	37,600
Poletimber-size trees	139,500	61,600	77,900
Total	412,100	296,600	115,500
Rotten cull trees:			
Sawtimber-size trees	186,000	14,000	172,000
Poletimber-size trees	70,500	8,300	62,200
Total	256,500	22,300	234,200
Total, all timber	4,983,200	2,718,100	2,265,100

Table 9.—*Volume of growing stock and sawtimber on commercial forest land, by ownership classes and by softwoods and hardwoods, New Hampshire, 1960*

Ownership class	All species	Softwoods	Hardwoods
GROWING STOCK *(Thousand cubic feet)*			
National Forest	801,900	274,900	527,000
Other public	108,200	66,900	41,300
Forest industry	665,700	403,400	262,300
Farmer and misc. private	2,738,800	1,654,000	1,084,800
All ownerships	4,314,600	2,399,200	1,915,400
SAWTIMBER *(Thousand board feet)* [1]			
National Forest	1,689,600	618,400	1,071,200
Other public	217,300	160,300	57,000
Forest industry	1,315,300	961,800	353,500
Farmer and misc. private	5,366,200	3,918,100	1,448,100
All ownerships	8,588,400	5,658,600	2,929,800

[1] International 1/4-inch rule.

Table 10.—*Volume of growing stock and sawtimber on commercial forest land, by stand-size classes and by softwoods and hardwoods, New Hampshire, 1960*

Stand-size class	All species	Softwoods	Hardwoods
GROWING STOCK *(Thousand cubic feet)*			
Sawtimber stands	2,569,100	1,543,900	1,025,200
Poletimber stands	1,657,800	825,000	832,800
Seedling-and-sapling stands	73,200	25,900	47,300
Nonstocked areas	14,500	4,400	10,100
Total	4,314,600	2,399,200	1,915,400
SAWTIMBER *(Thousand board feet)* [1]			
Sawtimber stands	6,598,400	4,271,400	2,327,000
Poletimber stands	1,936,600	1,370,800	565,800
Seedling-and-sapling-stands	53,400	16,400	37,000
Nonstocked areas	(2)	(2)	(2)
Total	8,588,400	5,658,600	2,929,800

[1] International 1/4-inch rule.
[2] Negligible.

Table 11. —*Volume of growing stock on commercial forest land, by species and diameter classes, New Hampshire, 1960*

(In thousands of cubic feet)

Species	Diameter class (*inches at breast height*)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9
Softwoods:										
White and red pine	1,049,300	96,300	146,300	214,200	168,200	185,000	74,700	55,100	109,500	—
Spruce	443,900	87,800	108,700	125,800	74,400	28,000	10,000	3,900	5,300	—
Balsam fir	512,800	172,400	205,000	80,600	36,100	8,700	9,300	200	500	—
Hemlock	380,600	43,800	86,800	70,200	56,400	38,700	37,700	25,100	21,900	—
Others	12,600	1,000	6,900	(1)	4,700	—	—	—	—	—
Total	2,399,200	401,300	553,700	490,800	339,800	260,400	131,700	84,300	137,200	—
Hardwoods:										
Northern red oak	270,300	62,900	87,600	47,000	24,200	25,200	10,800	5,100	7,500	—
Yellow birch	314,100	43,100	58,200	60,000	34,600	32,900	19,800	17,700	44,500	3,300
Sugar maple	240,000	53,400	35,300	25,100	29,800	33,700	10,600	22,300	27,900	1,900
Red maple	254,600	83,500	72,600	37,000	28,800	20,200	9,400	1,700	1,400	—
Beech	244,100	35,500	64,200	47,100	44,600	11,700	16,500	9,800	14,700	—
Paper birch	347,100	75,700	118,000	85,100	42,600	17,100	8,600	—	—	—
Others	245,200	70,200	63,800	30,900	27,000	21,200	22,800	5,600	3.700	—
Total	1,915,400	424,300	499,700	332,200	231,600	162,000	98,500	62,200	99,700	5,200
All species	4,314,600	825,600	1,053,400	823,000	571,400	422,400	230,200	146,500	236,900	5,200

[1] Negligible.

Table 12.—*Volume of sawtimber on commercial forest land by species and diameter classes, New Hampshire, 1960*

(In thousands of board feet)[1]

Species	Diameter class (*inches at breast height*)							
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9
Softwoods:								
White and red pine	3,071,900	721,200	601,800	699,500	304,800	247,000	497,600	—
Spruce	1,085,800	530,600	328,100	127,800	50,200	20,100	29,000	—
Balsam fir	600,600	335,400	171,800	35,500	53,800	1,300	2,800	—
Hemlock	885,400	221,900	208,200	114,400	145,200	103,800	91,900	—
Others	14,900	(2)	14,900	—	—	—	—	—
Total	5,658,600	1,809,100	1,324,800	977,200	554,000	372,200	621,300	—
Hardwoods:								
Northern red oak	366,900	—	106,600	136,900	53,100	27,300	43,000	—
Yellow birch	724,500	—	134,400	190,500	87,200	80,400	217,700	14,300
Sugar maple	566,300	—	113,600	156,300	44,000	115,900	126,800	9,700
Red maple	246,900	—	103,100	92,100	37,700	7,600	6,400	—
Beech	477,100	—	184,900	55,900	82,600	61,300	92,400	—
Paper birch	318,700	—	164,100	87,800	44,700	18,300	3,800	—
Others	229,400	—	102,700	31,900	81,000	4,600	9,200	—
Total	2,929,800	—	909,400	751,400	430,300	315,400	499,300	24,000
All species	8,588,400	1,809,100	2,234,200	1,728,600	984,300	687,600	1,120,600	24,000

---

[1] International 1/4-inch rule.

[2] Negligible.

Table 13. — *Net annual growth and annual cut of growing stock on commercial forest land, by species, New Hampshire, 1959*

(In thousands of cubic feet)

Species	Net annual growth	Annual timber cut
Softwoods:		
White and red pine	31,100	27,600
Spruce and fir	28,400	5,100
Other eastern softwoods	11,600	9,700
Total	[1] 71,100	42,400
Hardwoods:		
Northern red oak	6,600	2,600
Yellow birch	7,600	10,000
Sugar maple	5,800	5,100
Other eastern hardwoods	26,500	6,000
Total	[2] 46,500	23,700
All species	117,600	66,100

[1] Net annual growth was calculated for all softwood trees combined. This total was prorated to above softwood species.

[2] Net annual growth was calculated for all hardwood trees combined. This total was prorated to above hardwood species.

Table 14. — *Net annual growth and annual cut of growing stock on commercial forest land, by ownership classes and by softwoods and hardwoods, New Hampshire, 1959*

Species groups	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
		NET ANNUAL GROWTH *(thousand cubic feet)*			
Softwoods [1]	71,100	8,200	2,000	11,900	49,000
Hardwoods [2]	46,500	12,800	1,000	6,400	26,300
All species	117,600	21,000	3,000	18,300	75,300
		ANNUAL TIMBER CUT *(thousand cubic feet)*			
Softwoods	42,400	500	100	2,000	39,800
Hardwoods	23,700	1,200	100	5,000	17,400
All species	66,100	1,700	200	7,000	57,200

[1] Net annual growth for softwood trees was calculated for all ownerships combined. This total was prorated to above ownership classes.

[2] Net annual growth for hardwood trees was calculated for all ownerships combined. This total was prorated to above ownership classes.

Table 15.—*Net annual growth and annual cut of sawtimber on commercial forest land, by species, New Hampshire, 1959*

(In thousands of board feet)[1]

Species	Net annual growth	Annual timber cut
Softwoods:		
White and red pine	99,900	118,000
Spruce and fir	54,900	25,500
Other eastern softwoods	29,300	21,400
Total	[2] 184,100	164,900
Hardwoods:		
Northern red oak	8,500	11,300
Yellow birch	16,800	38,400
Sugar maple	13,100	17,500
Other eastern hardwoods	29,500	21,600
Total	[3] 67,900	88,800
All species	252,000	253,700

[1] International 1/4-inch rule.

[2] Net annual growth was calculated for all softwood trees combined. This total was prorated to above softwood species.

[3] Net annual growth was calculated for all hardwood trees combined. This total was prorated to above hardwood species.

Table 16.—*Net annual growth and annual cut of sawtimber on commercial forest land, by ownership classes and by softwoods and hardwoods, New Hampshire, 1959*

Species groups	All ownerships	National Forest	Other public	Forest Industry	Farmer and misc. private
NET ANNUAL GROWTH *(thousand board feet)* [1]					
Softwoods [2]	184,100	20,100	5,200	31,300	127,500
Hardwoods [3]	67,900	24,800	1,300	8,200	33,600
All species	252,000	44,900	6,500	39,500	161,100
ANNUAL TIMBER CUT *(thousand board feet)* [1]					
Softwoods	164,900	2,900	—	22,000	140,000
Hardwoods	88,800	5,200	—	8,000	75,600
All species	253,700	8,100	—	30,000	215,600

[1] International 1/4-inch rule.

[2] Net annual growth for softwood trees was calculated for all ownerships combined. This total was prorated to above ownership classes.

[3] Net annual growth for hardwood trees was calculated for all ownerships combined. This total was prorated to above ownership classes.

Table 17. — *Annual mortality of growing stock and sawtimber on commercial forest land, by softwoods and hardwoods, New Hampshire, 1959*

Species group	Growing stock	Sawtimber
	Thousand cubic feet	*Thousand board feet* [1]
Softwoods	21,600	50,300
Hardwoods	14,100	18,600
All species	35,700	68,900

[1] International 1/4-inch rule.

Table 18. — *Total output of timber products, by products, by type of material used, and by softwoods and hardwoods, New Hampshire, 1959*

Product and species groups	Total output in standard units		Output from roundwood		Output from plant by-products (standard units)
	Unit	Number	Standard units	M cubic feet	
Sawlogs:					
Softwood	M bd. ft. [1]	167,900	167,900	31,700	—
Hardwood	M bd. ft. [1]	35,300	35,300	7,200	—
Total	M bd. ft. [1]	203,200	203,200	38,900	—
Veneer logs and bolts:					
Softwood	M bd. ft.	—	—	—	—
Hardwood	M bd. ft.	11,500	11,500	2,100	—
Total	M bd. ft.	11,500	11,500	2,100	—
Cooperage logs and bolts:					
Softwood	M bd. ft.	2,700	2,700	500	—
Hardwood	M bd. ft.	600	600	100	—
Total	M bd. ft.	3,300	3,300	600	—
Pulpwood:					
Softwood	Std. cords [2]	145,300	118,700	9,500	26,600
Hardwood	Std. cords [2]	111,900	111,700	8,900	200
Total	Std. cords [2]	257,200	230,400	18,400	26,800
Piling:					
Softwood	M linear ft.	—	—	—	—
Hardwood	M linear ft.	9	9	4	—
Total	M linear ft.	9	9	4	—

CONTINUED

Table 18. — Continued

Product and species groups	Total output in standard units		Output from roundwood		Output from plant by-products (standard units)
	Unit	Number	Standard units	M cubic feet	
Poles:					
Softwood	M pieces	4	4	99	—
Hardwood	M pieces	—	—	—	—
Total	M pieces	4	4	99	—
Misc. industrial[3] wood:					
Softwood	M cu. ft.	69	69	69	—
Hardwood	M cu. ft.	229	221	221	8
Total	M cu. ft.	298	290	290	8
Posts (round and split):					
Softwood	M pieces	14	14	11	—
Hardwood	M pieces	102	102	46	—
Total	M pieces	116	116	57	—
Fuelwood:					
Softwood	Std. cords	11,200	600	43	10,600
Hardwood	Std. cords	86,700	75,500	6,042	11,200
Total	Std. cords	97,900	76,100	6,085	21,800
All products:					
Softwood	M cu. ft.	44,900	42,000	42,000	2,900
Hardwood	M cu. ft.	25,600	24,700	24,700	900
Total	M cu. ft.	70,500	66,700	66,700	3,800

---

[1] International 1/4-inch rule.

[2] Rough wood basis (for example, chips converted to equivalent standard cords).

[3] Includes hewn ties, excelsior bolts, shingle bolts, turnery bolts, chemical wood, etc.

Table 19. — *Total output of roundwood products, by source and by softwoods and hardwoods, New Hampshire, 1959*

(In thousands of cubic feet)

Source	All species	Softwoods	Hardwoods
Growing-stock trees: [1]			
Sawtimber trees	47,841	34,592	13,249
Poletimber trees	12,676	5,289	7,387
Total	60,517	39,881	20,636
Cull trees [1]	1,221	600	621
Salvable dead trees [1]	603	136	467
Other sources [2]	4,307	1,356	2,951
All sources	66,648	41,973	24,675

[1] On commercial forest land.

[2] Includes noncommercial forest land, nonforest land such as fence rows, trees less than 5.0 inches in diameter, and treetops and limbs.

Table 20. — *Annual timber cut from growing stock on commercial forest land, by products and logging residues, and by softwoods, and hardwoods, New Hampshire, 1959*

(In thousands of cubic feet)

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	36,958	31,007	5,951
Veneer logs and bolts	2,095	—	2,095
Cooperage logs and bolts	628	507	121
Pulpwood	16,432	8,143	8,289
Piling	4	4	—
Poles	98	98	—
Misc. industrial wood	272	68	204
Posts	56	11	45
Fuelwood	3,974	43	3,931
All products	60,517	39,881	20,636
Logging residues	5,574	2,552	3,022
Timber cut	66,091	42,433	23,658

Table 21. — *Annual timber cut from live sawtimber on commercial forest land, by products and logging residues, and by softwoods and hardwoods, New Hampshire, 1959*

(In thousands of board feet)[1]

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	183,520	143,884	39,636
Veneer logs and bolts	11,028	—	11,028
Cooperage logs and bolts	2,959	2,352	607
Pulpwood	32,833	17,525	15,308
Piling	20	20	—
Poles	426	426	—
Misc. industrial wood	429	127	302
Posts	42	—	42
Fuelwood	8,965	—	8,965
All products	240,222	164,334	75,888
Logging residues	13,477	550	12,927
Timber cut	253,699	164,884	88,815

[1] International 1/4-inch rule.

Table 22. — *Volume of unused plant residues by industrial source[1] and by type of residue, and by softwoods and hardwoods, New Hampshire, 1959*

(In thousands of cubic feet)

Species group	Total	Coarse [2]	Fine [3]
Softwoods	5,045	1,145	3,900
Hardwoods	1,438	538	900
All species	6,483	1,683	4,800

[1] The lumber industry was the only source in New Hampshire.
[2] Unused material suitable for chipping, such as slabs, edgings, and veneer cores.
[3] Unused material not suitable for chipping, such as sawdust and shavings.

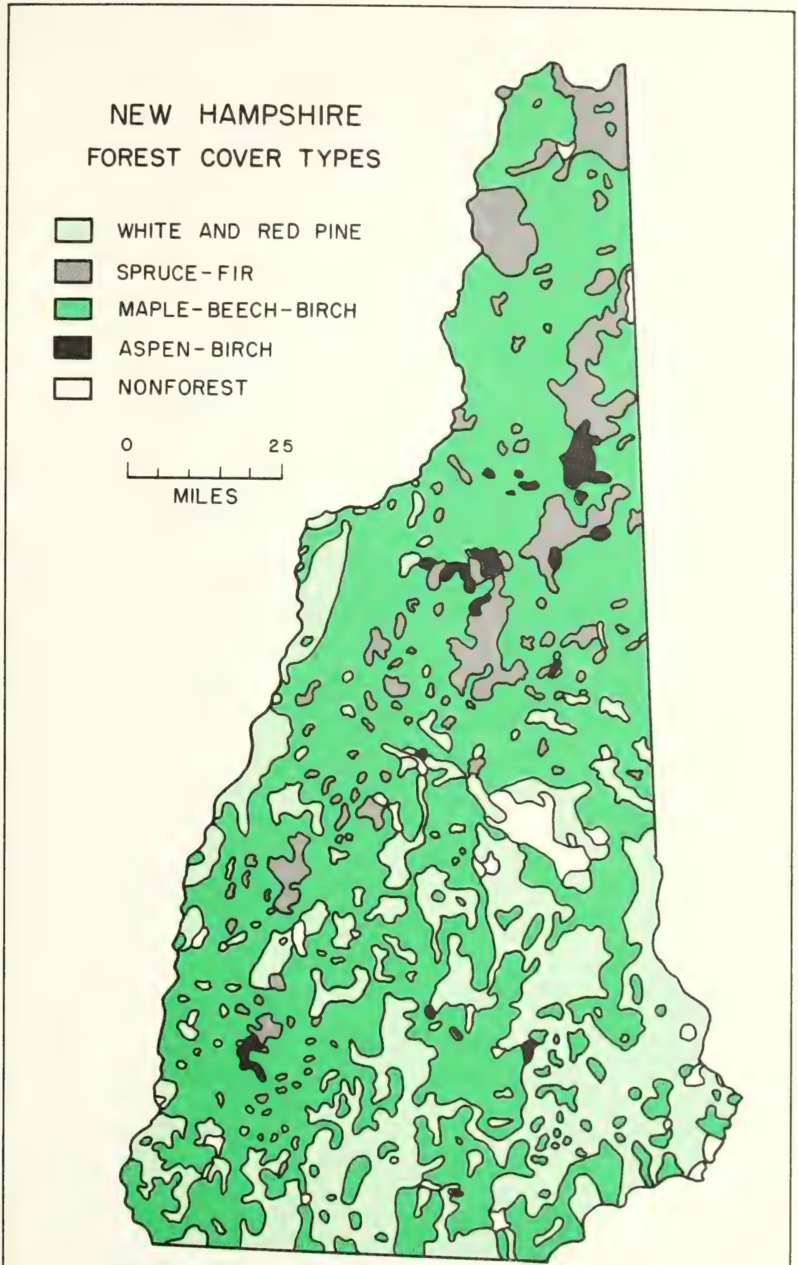

Figure 16. — The delineation of forest cover types in New Hampshire. The type boundaries are unchanged from those delineated in 1947.

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Compilation of statistics for National Forest land was done by the staff in the Regional Foresters' office. Compilation of statistics for land outside the White Mountain National Forest and compilation of the combined estimates were done by the Division of Forest Economics Research of the Northeastern Forest Experiment Station.

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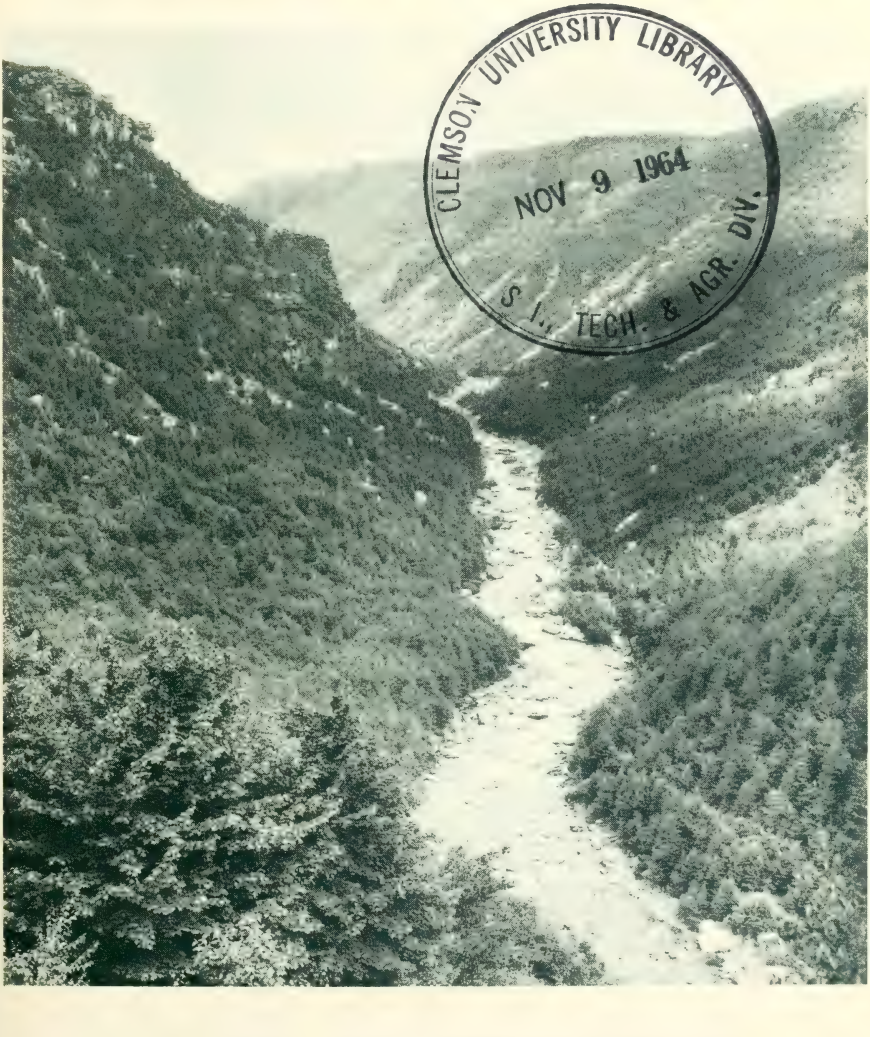
The
TIMBER RESOURCES
# of WEST VIRGINIA



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NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
RALPH W. MARQUIS, DIRECTOR

PREFACE

TO PROVIDE up-to-date information about the forest resources of the Nation, the Forest Service, U. S. Department of Agriculture, conducts a series of continuing forest surveys of the various states.

This is a report on the latest forest resurvey of West Virginia, made by the Northeastern Forest Experiment Station. It supersedes a report published in 1952, which contained forest-resource data based on an earlier survey made by the Northeastern Station.

In this resurvey, a scientifically designed sampling system, partly based upon remeasured plots, was used. Data were collected and analyzed by the forest-survey staff of the Northeastern Forest Experiment Station, except for the area of the Monongahela National Forest, in which the resurvey field work was done by National Forest personnel.

Users of the data in this report are cautioned to read with care the definitions of the terms used, the description of the forest-survey methods, and the statements pertaining to the reliability of the estimates.

The TIMBER RESOURCES of WEST VIRGINIA

by

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Highlights

TWELVE years ago, the Northeastern Forest Experiment Station published a report on forest statistics for West Virginia. The data were based upon forest-survey sample plots established in 1946-49 and upon a timber-product-utilization survey. Many significant changes in the timber resource have taken place since then. To bring the forest statistics up to date, the forests of West Virginia were recently resurveyed. In this resurvey, completed in 1961, some of the original forest-survey plots were remeasured and additional new forest plots were established. This resurvey showed that—

- Commercial forest land in 1961 amounted to 11,389,000 acres, an increase of 1,500,000 acres.
- Net volume in trees 5.0 inches d.b.h. and larger amounted to 11 billion cubic feet. This is an increase of almost 5 billion cubic feet.
- Volume in red oaks, yellow-poplar, chestnut oak, and hickory increased by more than ½ billion cubic feet each.

- Sawtimber volume (softwood trees 9.0 inches d.b.h. and larger and hardwood trees 11.0 inches d.b.h. and larger) amounted to nearly 29 billion board feet, an increase of almost 65 percent.

- Sixty percent of the current sawtimber volume is in trees 15.0 inches in diameter and larger at breast height.

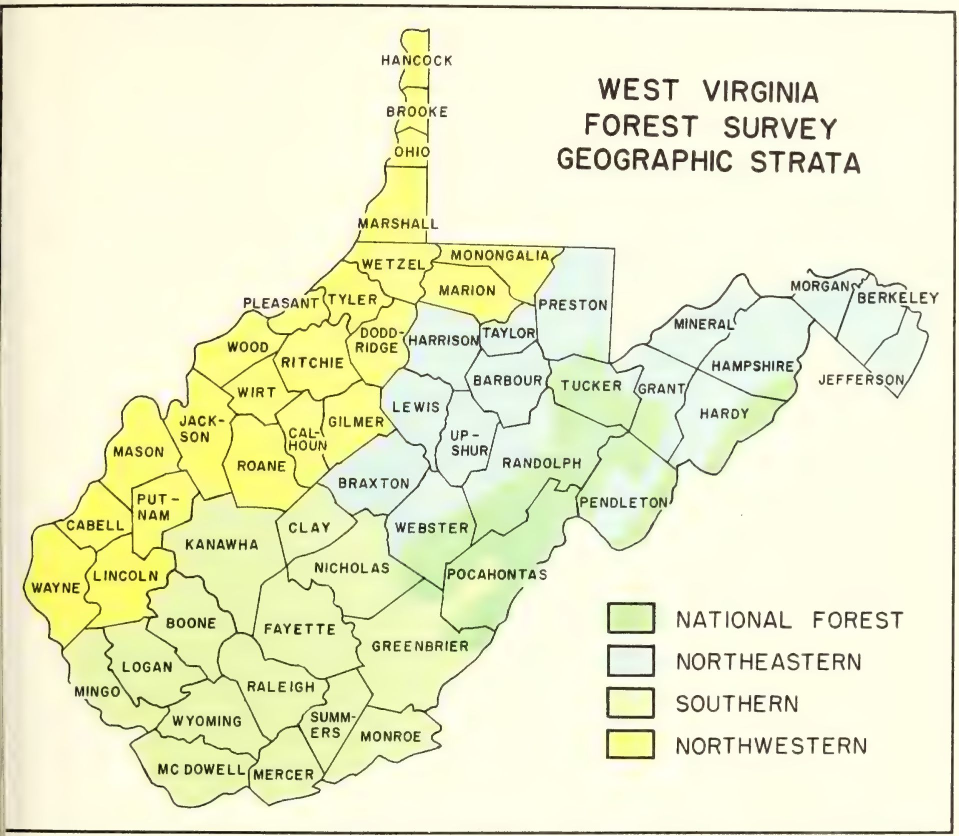
- Net annual growth of trees 5.0 inches d.b.h. and larger is 370 million cubic feet. Ingrowth (saplings that became poletimber during the inventory year) makes up 200 million cubic feet or 54 percent of the net annual growth. Timber cut for all products in 1960 was 119 million cubic feet.

- Net annual growth of sawtimber is 1,041 million board feet, and the sawtimber volume cut in 1960 was less than one-half of the net annual growth.

In this resurvey of the timber resources of West Virginia, the data were broken down into greater detail than in other forest surveys, to provide data not only for the State as a whole, but also for subsections of the State. To this end, West Virginia was divided into four geographic sampling strata: (1) National forest land; (2) the northeastern section; (3) the southern section; and (4) the northwestern section (fig. 1).

The findings of the resurvey are described in the text pages that follow. An appendix at the end of this report contains details about the forest survey, and 98 tables of statistical data, including data for the four geographic sampling areas and the counties in them.

Figure 1.—Forest-survey geographic sampling strata in West Virginia.



Forest Area

ALMOST three-fourths of the land area in West Virginia is now covered by forest. Although these forests serve a number of uses, here they will be looked at as present and future sources of timber for industrial use.

Commercial forest-land area in the State amounts to 11,389,000 acres. A relatively small amount of forest land (less than 1 percent) is classified as noncommercial. About 34,000 acres of noncommercial forest land are considered unproductive because of adverse site conditions, and 46,000 acres have been withdrawn from timber utilization (table 1, in appendix). Most of the reserved forest land is in State parks, and some is in the National forests.

Forest-Land Ownership

Forest-industry holdings in West Virginia amount to 530,000 acres, only 5 percent of the commercial forest land (table 2). National Forest land (775,000 acres on the Monongahela National Forest and 94,000 acres on the George Washington National Forest) makes up 8 percent, and State-owned forest land makes up 1 percent. Farmers own one-fourth of the total commercial forest land.

But the bulk of the commercial forest land—7,000,000 acres, about 60 percent of the total—is owned by large coal and land-holding companies and corporations and by diverse individuals such as businessmen, laborers, professional people, clerks, housewives, and retirees.

Stand-Size Classes

Stand-size class[1] in 1961 was determined by a plurality of stocking based upon numbers of trees. For example, sawtimber stands have to be more than one-half stocked with sawtimber and poletimber trees and the sawtimber stocking must be at least equal to poletimber stocking.

About one-half of the commercial forest land—5,605,000 acres —supports sawtimber stands (table 3). Twenty-seven percent of the forest land is covered by poletimber stands. Sapling-and-seedling stands and nonstocked areas make up a little less than one-fourth of the commercial forest-land area.

Stocking of Forest Land

Almost all the commercial forest land is well stocked with some kind of trees. Ninety-five percent of the forest area is more than 70 percent stocked, if cull trees and trees of noncommercial species are included. If only the growing-stock trees are considered in this percent-stocking class, the percentage drops to 63 percent

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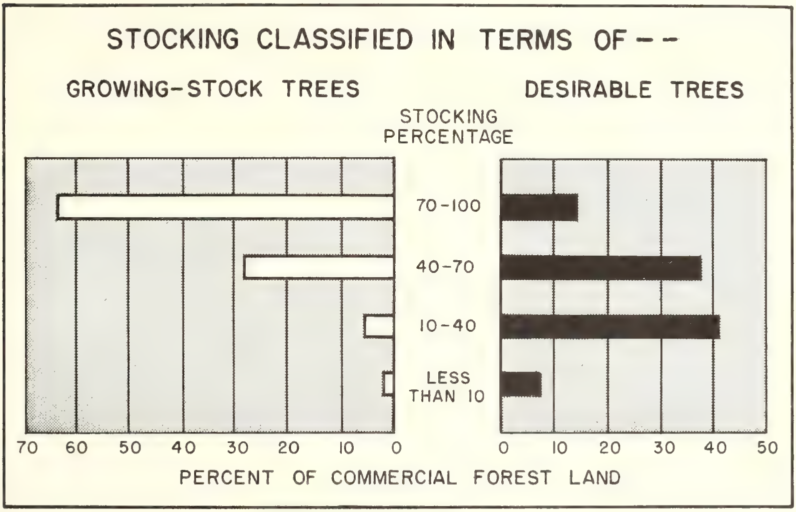
[1] See appendix for definitions of this term and other terms used in this report.

Figure 2.—In terms of growing-stock trees, most of the commercial forest land in West Virginia is well stocked, but in terms of desirable trees, the land is not well stocked.



(fig. 2). If only the trees of highly-valued species are considered —such as northern red oak, hard maple, and yellow-poplar—or less-valued species such as blackgum and beech that contain a grade 1 or grade 2 butt log—the area that is more than 70 percent stocked with such trees amounts to only 14 percent of the commercial forest land.

Area-Condition Classes

Stocking in terms of *desirable trees* is used to classify forest stands into area-condition classes. These classes are based upon minimum percentages of area occupied. A key to the specifications for each area-condition class is shown in figure 3. For example, class 1 has a minimum of 70 percent stocking with desirable trees. The other 30 percent could consist of land already stocked with such trees, or of land on which desirable trees will naturally restock, or of land on which desirable trees cannot naturally restock, or of any combination of these conditions. The acreage of class 1 amounts to 1.6 million acres (table 7).

Stands classified as area-condition classes 2 and 4 are less than 70 percent stocked with desirable trees but have less than 30

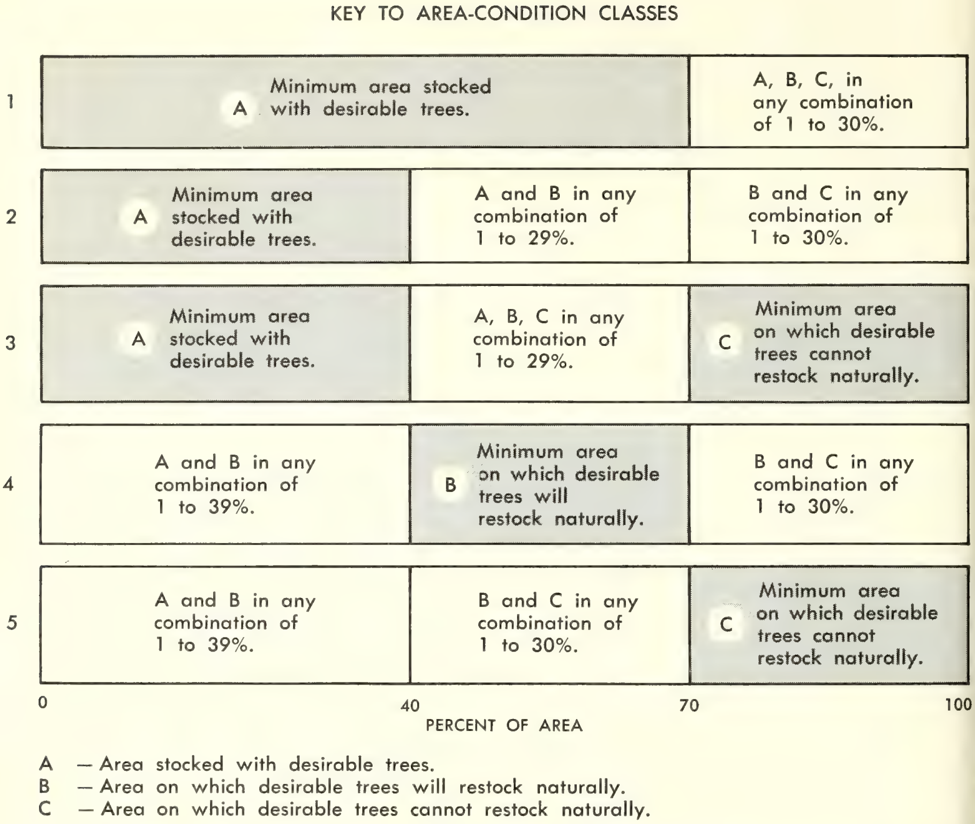

KEY TO AREA-CONDITION CLASSES
1
A Minimum area stocked with desirable trees.
A, B, C, in any combination of 1 to 30%.
2
A Minimum area stocked with desirable trees.
A and B in any combination of 1 to 29%.
B and C in any combination of 1 to 30%.
3
A Minimum area stocked with desirable trees.
A, B, C in any combination of 1 to 29%.
C Minimum area on which desirable trees cannot restock naturally.
4
A and B in any combination of 1 to 39%.
B Minimum area on which desirable trees will restock naturally.
B and C in any combination of 1 to 30%.
5
A and B in any combination of 1 to 39%.
B and C in any combination of 1 to 30%.
C Minimum area on which desirable trees cannot restock naturally.
0
40
70
100
PERCENT OF AREA
A — Area stocked with desirable trees.
B — Area on which desirable trees will restock naturally.
C — Area on which desirable trees cannot restock naturally.

Figure 3.—Area-condition classes are based upon minimum percentages of area that are occupied or could be occupied by desirable trees.

percent of the area controlled by inhibiting vegetation, water, or rock and have an adequate seed source and seedbed conditions favorable to natural restocking. (See appendix for a more complete definition.) Acreage in these classes totals 2.9 million acres. These three favorable area-condition classes make up about 40 percent of the commercial forest-land area in West Virginia.

Other Classes of Forest Area

The remeasurement of permanent sample plots in West Virginia provided for the first time the means for evaluating the forest land in terms of cubic-foot growth per acre. More than three-fourths of the commercial forest land in the State is producing less than 50 cubic feet of growing-stock volume per year (table 8). Seventeen percent produces 50 to 85 cubic feet per acre per year, and 7 percent produces more than 85 cubic feet.

Forest-type classifications were based upon a plurality of basal area for certain indicator species whenever a sufficient number of trees were tallied on a plot. If an insufficient number of trees were present, the fieldmen classified the forest type.

The oak-hickory forest type covers two-thirds of the commercial forest-land area—7.5 million acres (table 9). The maple-beech-birch type is the next most prevalent forest type; it accounts for one-fifth of the area. Softwood forest types make up only 6 percent of the total forest area—some 700,000 acres.

A forest cover type map that shows a generalized delineation of the major forest types is in the appendix (fig. 17).

Growing Stock

Growing stock is made up of the net cubic-foot volume in trees 5.0 inches d.b.h. and larger, including both poletimber and sawtimber, between the stump and a minimum 4-inch top diameter of the central stem. The total growing-stock volume on commercial forest land in West Virginia amounts to 11,060 million cubic feet. Sawtimber stands have an average of about 1,370 cubic feet per acre, and poletimber stands have 890 cubic feet per acre.

Volume in poletimber trees makes up 40 percent of the total. The volume in sawtimber trees makes up 60 percent—56 in the sawlog portion and 4 in the upper-stem portion (table 13). Hardwood species account for 95 percent of the total volume.

In addition to the growing-stock trees, there are sawtimber-size cull trees (trees that do not contain a sawlog or that are of noncommercial species) that take up growing space. One tree out of every five sawtimber trees in West Virginia is a cull tree (tables 11 and 12). For every 1,000 cubic feet of growing stock there is an additional 85 cubic feet of sound wood in almost worthless cull trees.

Ownership

More than 10 percent of the growing-stock volume is on National forest land (table 14). The average volume per acre of the National forests is 1,400 cubic feet, about 50 percent greater than the average volume per acre on all commercial forest land outside the National forests. This is due in part to the relatively small acreage of seedling-and-sapling stands and nonstocked areas in the National forests.

On other public-owned forest land, growing-stock volume amounts to 4 percent of the total; and on forest-industry holdings growing-stock volume amounts to 6 percent. The bulk of the volume (four-fifths of the total) is owned by farmers and all other kinds of private owners.

Species Distribution

Oaks make up more than 40 percent of the hardwood volume, 4,437 million cubic feet (table 16). The oak volume is about equally divided between the more desired species—white oak and northern red oak—and other white and red oaks (fig. 4). Hickory and yellow-poplar are the next most abundant species: each accounts for about 10 percent of the hardwood volume. Sugar maple, red maple, and beech individually make up 5 to 7 percent of the volume.

Pitch pine, Virginia pine, and hemlock make up almost two-thirds of the softwood volume. Shortleaf pine, white pine, and spruce make up the balance.

Cordwood Equivalent

Cubic-foot volume can be converted to standard cords by dividing by 80. However, this is only an approximation. On this basis there are about 138 million cords of growing stock—an average of about 12 cords per acre of commercial forest land. Twenty-four percent of the commercial forest land area at present has less than 3 cords per acre.

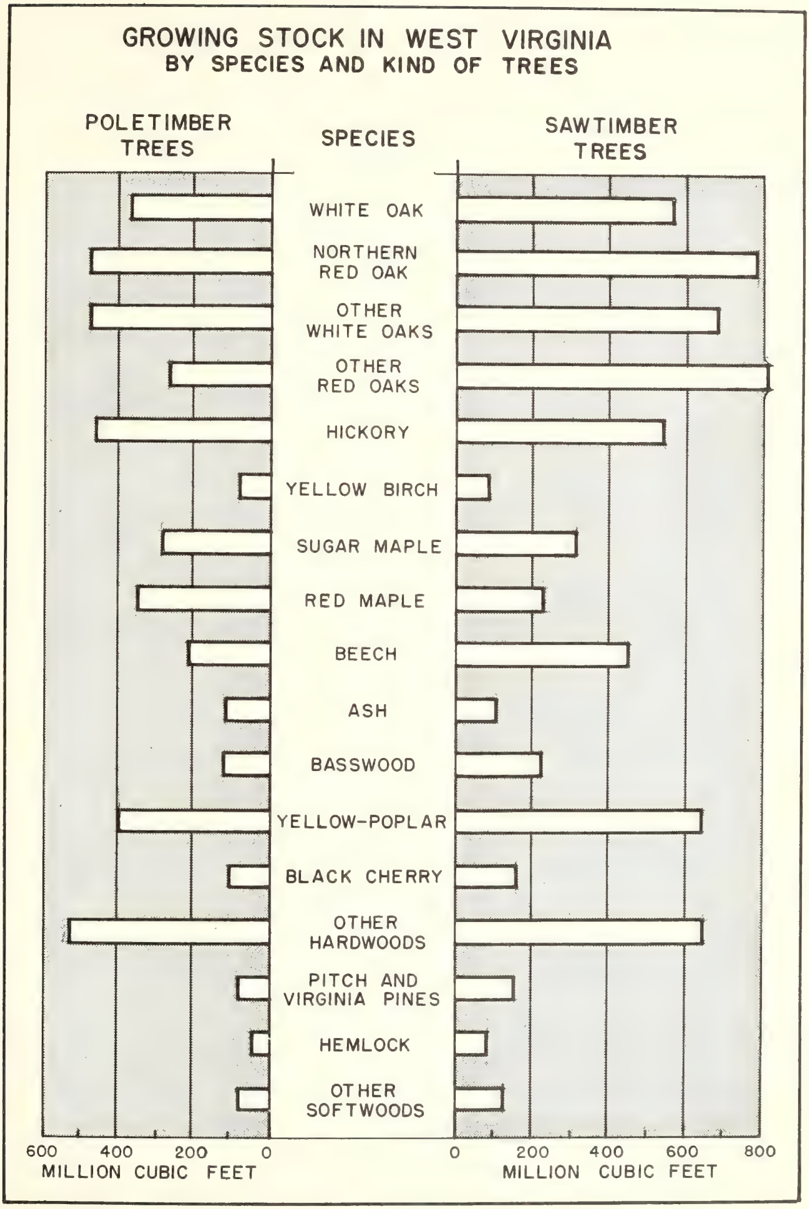


Figure 4.—Hardwoods make up 95 percent of the total cubic-foot volume. Volume for sawtimber trees is greater than for poletimber trees for most species. The average ratio is 6 to 4.

Sawtimber Volume

Softwood trees 9.0 inches in diameter and larger and hardwood trees 11.0 inches and larger that meet minimum specifications for sawtimber were measured for the estimate of board-foot volume based upon the International ¼-inch log rule. Net sawtimber volume on commercial forest land in West Virginia amounts to nearly 29 billion board feet.

Species Distribution

One-fifth of the total board-foot volume is in the oaks of the more desired species—white oak and northern red oak (table 17). Twenty-three percent is in the less desired species such as chestnut oak, black oak, and scarlet oak. Yellow-poplar, next in abundance, makes up to 10 percent of the total, and hickory makes up 8 percent. The volume in softwoods is relatively small, only 1.6 billion board feet; and it makes up almost 6 percent of the total volume for all species.

Ownership

Sawtimber volume on National forest land (2.9 billion board feet) amounts to 10 percent of the total (table 14). Other public ownerships (mainly the State) and holdings of forest industries together account for about another 10 percent. Farmers and other private individuals and organizations own the remaining 23.2 billion board feet—80 percent of the total. The timber is less concentrated in these ownerships and averages 2,400 board feet per acre for commercial forest land; the average volume per acre for public ownerships and industrial holdings is 3,600 board feet.

Stand Size

More than 80 percent of the current sawtimber volume is in sawtimber stands (table 15). These stands contain an average of 4,300 board feet per acre. Thirteen percent of the total is in poletimber stands that have an average volume per acre of 1,170 board feet. The remaining volume (4 percent of the total) is in sawtimber trees scattered about in some of the seedling-and-sapling stands, and this volume averages less than 500 board feet per acre.

Timber Quality

About 60 percent of the board-foot volume is in trees 15.0 inches in diameter and larger at breast height. These larger-size trees greatly influence the amount of volume in high-quality grade 1 standard-lumber logs. This grade requires that the scaling diameter at the small (top) end of the butt log shall be a minimum of 13 to 15 inches for most hardwood species.

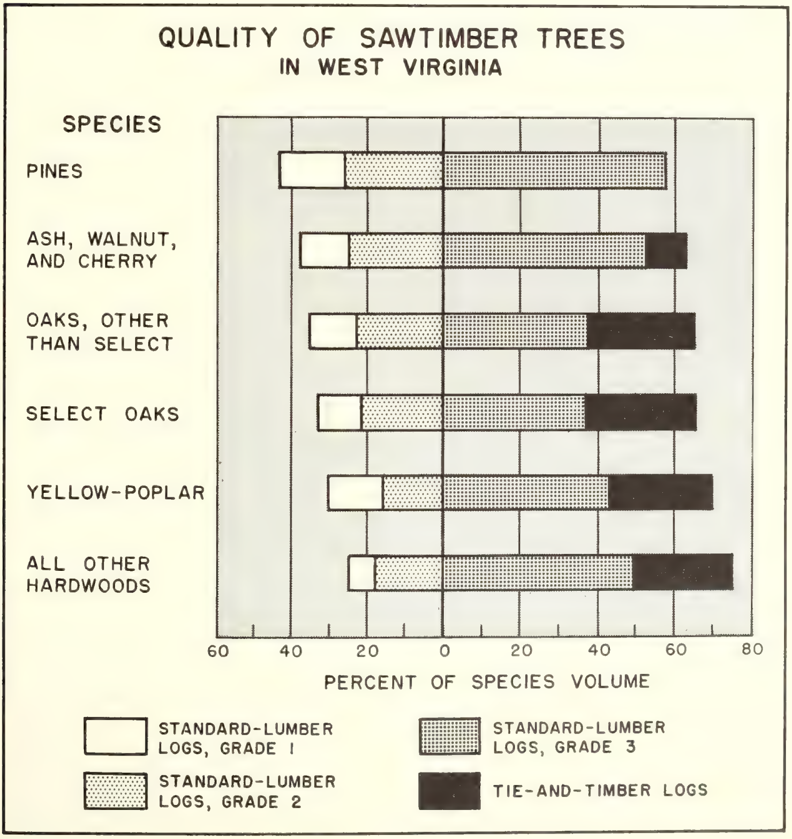


Figure 5.—Most of the principal species in West Virginia have one-third or more sawtimber volume in the better standard-lumber log grades 1 and 2.

For both hardwoods and pines, there are three standard-lumber log grades. For hardwoods there is an additional class: tie-and-timber logs. A hardwood sawlog that fails to meet the minimum specifications for a grade 3 standard-lumber log but meets certain other specifications is classed as a tie-and-timber log.

Ten percent of the volume in hardwood sawtimber trees meets the minimum specifications for grade 1 standard-lumber logs (table 18). These logs are expected to yield about two-thirds of their volume as No. 1 common and better standard lumber. Yellow-poplar has a greater proportion of grade 1 standard-lumber logs than any other hardwood—14 percent (fig. 5).

Twenty percent of the hardwood sawtimber volume meets the minimum specifications for grade 2 standard-lumber logs that should yield about one-half of their volume as No. 1 common and better. Forty-five percent meets the minimum specifications for grade 3 and should yield about one-fifth of its volume as No. 1 common and better standard lumber. Twenty-five percent is classified as tie-and-timber logs.

Most of the softwood sawtimber volume is of value to the lumber industry. Only the pines were classified into three standard-lumber log grades: all other softwoods were graded into one class. About one-sixth of the white pine and yellow pine meets the minimum specifications for grade 1 standard-lumber logs, and about one-fourth meets the specifications for grade 2.

Timber Growth and Cut

Timber volume in West Virginia is increasing. More wood is being grown than is being cut—370 million cubic feet versus 120 million. The estimate of timber growth is based upon remeasured sample plots and not upon increment-core measurements.

Growing Stock

The 370 million cubic feet are composed of three parts: *increase in volume* of surviving growing-stock trees that were already 5.0 inches in diameter and larger, plus *ingrowth* (the volume of trees that become 5.0 inches in diameter and larger during the period between surveys), less *volume of dead trees.* Components of net annual growth of growing stock and their volumes, in millions of cubic feet, are:

Growth on growing stock	214
Ingrowth into poletimber	+200
Total growth	414
Annual mortality	— 44
Net annual growth	370

Ingrowth makes up almost half (48 percent) of the total growth. This implies that the average timber stand in the State is young and vigorous. In the 1949 survey, ingrowth made up almost one-fourth (24 percent) of total growth.

Most of the net annual growth, and also the timber cut, is made up of the various species of oak (fig. 6). Oaks (principally white oak and northern red oak) make up 37 percent of the growth and 45 percent of the cut (table 21). Yellow-poplar makes up about 13 percent, softwood species about 7 percent, and hickory about 6 percent of the total growth. All other hardwood species combined account for the rest of the net annual growth, an amount equal to that for the oaks.

Although the amount of timber growth appears large when compared to the amount that is cut, it is not large when examined in terms of annual growth per acre. The average net annual growth per acre for poletimber and sawtimber stands in West Virginia is 40 cubic feet, or ½ cord per acre per year. Sawtimber growth for only sawtimber stands is 150 board feet per acre per year.

Sawtimber

The relationship of net annual growth to timber cut for sawtimber trees is about the same as for growing stock—sawtimber volume is increasing for most species. One billion board feet of sawtimber is added to the forest inventory each year, and a little less than ½ billion board feet is being cut (table 23). The

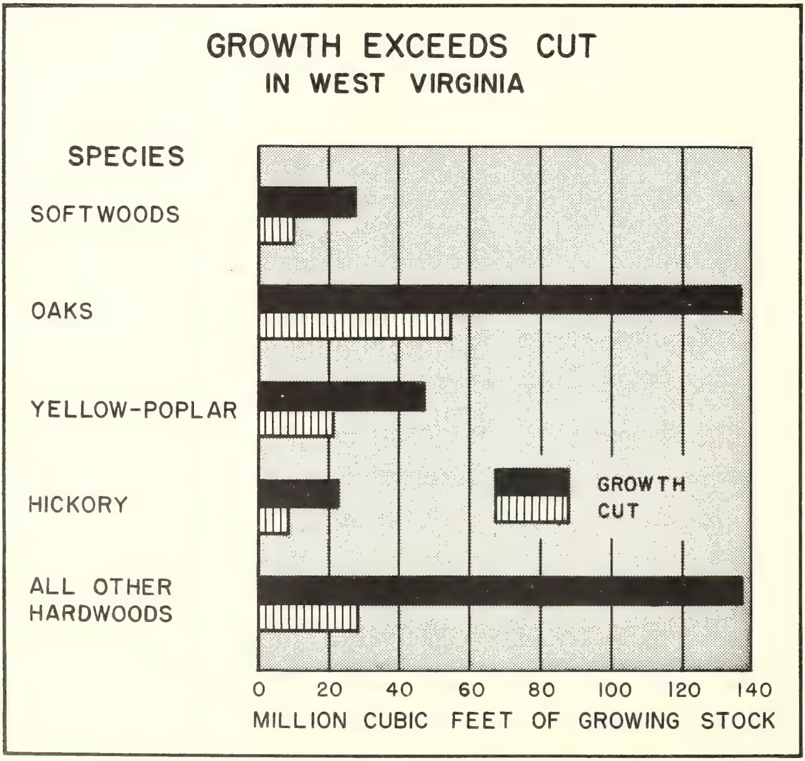


Figure 6.—Net annual growth of growing stock is more than three times the volume cut in 1960.

growth is about equally divided between the increase in volume of sawtimber trees and ingrowth, the volume of trees that become sawtimber size during the interval between surveys.

Mortality

The net annual growth that has been referred to is total growth less mortality. The remeasurement of permanent forest-survey sample plots in West Virginia has provided, for the first time, an excellent means of estimating timber loss due to mortality. The volume of growing stock that dies each year amounts to 43.9 million cubic feet, approximately 10 percent of total growth (table 25). About one-half of this volume is in sawtimber trees, a loss of about 98 million board feet.

Causes of mortality are difficult to ascertain, but most probably disease is the principal cause, accounting for almost 60 percent of the growing-stock volume loss. Fire accounts for 11 percent; and all other causes, such as man, animal, and lightning, account for about 30 percent of the total loss.

Changes Between Surveys

Changes in estimates can be due to a combination of two possibilities: real changes that have taken place between the two surveys, and apparent changes inherent in sampling. For example, each estimate of total commercial forest land for the two surveys had a sampling error of 0.7 percent, at the 66.8-percent probability level. This means that in 1949 the actual acreage probably fell between the limits of 9,791 and 9,929 thousand acres, and in 1961 it probably fell between 11,309 and 11,469 thousand acres. The difference between the minimum acreage for 1961 and the maximum acreage for 1949 is 1,380 thousand acres.

Most of the increase of commercial forest land is undoubtedly due to a real change. This is supported by the fact that more than 1½ million acres of open farm land were abandoned in the interval between the two surveys. The U.S. Census of Agriculture for 1959 shows that the number of farms in West Virginia decreased from 81,434 in 1950 to 44,011 in 1959. In this same period the acreage of open land on farms (cropland and pasture other than woodland) decreased by 31 percent (1.4 million acres).

The increases in growing-stock and sawtimber volumes can be attributed to the greater volume of net annual growth as compared to the amount of timber cut each year. Increase in growing-stock volume is also due to the increase in commercial forest-land area.

Forest Area

Commercial forest land increased, during the 12 years between surveys, by 1.5 million acres to the current total of 11.4 million acres. The largest increase is in the northwestern section of the State—about 800,000 acres. Changes in area of commercial forest land for each of the geographic strata are:

	1949 (million acres)	*1961 (million acres)*	*Change (percent)*
National forest land	0.9	0.9	—
Northeastern section	3.0	3.4	12
Southern section	3.7	4.0	9
Northwestern section	2.3	3.1	35
State total	9.9	11.4	15

The forest area classified as sawtimber stands increased more than any other stand-size class, from 4.4 million acres to 5.6 million acres (fig. 7). In the 1961 survey, sawtimber stands were those that had a plurality in the number of sawtimber trees. In 1949, sawtimber stands were those that had a minimum of 1,500 board feet per acre (International 1/4-inch rule). Area in poletimber stands decreased slightly during the same period. The area in seedling-and-sapling stands increased by about 600,000 acres.

Associated with these changes is the stocking per acre of forest land. In 1949 the average net volume per acre of all growing stock was 630 cubic feet; now it is 970 cubic feet—approximately a 50-percent increase. Sawtimber stands increased from 3,500 board feet per acre to 4,300 board feet, and poletimber stands increased from 450 to 890 cubic feet per acre. These changes by stand-size class are probably due to the 1961 classification used (see definitions in appendix) as opposed to the volume-per-acre classifications used in 1949.

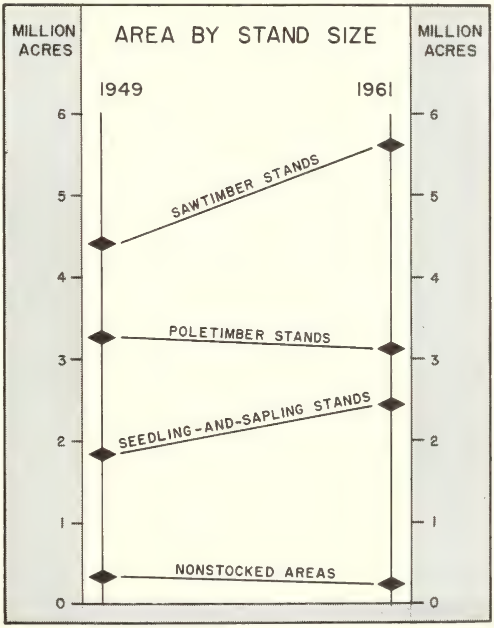


Figure 7. — The largest increases in area occurred in sawtimber stands and in seedling - and - sapling stands.

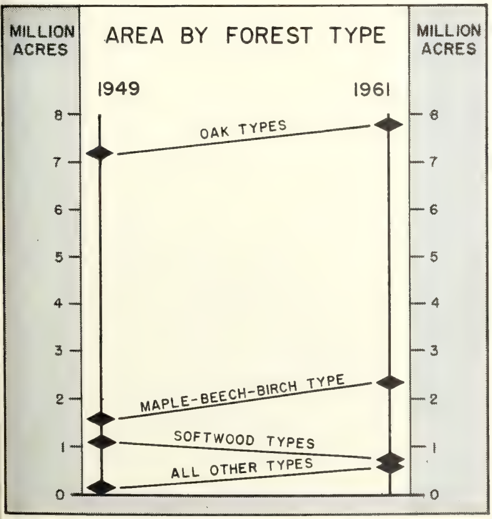


Figure 8. — All forest types except softwoods increased in acreage.

All forest types except the softwoods also increased considerably in acreage. Oak types increased by almost 600,000 acres, maple-beech-birch types by more than 750,000 acres, and all other hardwood types by 500,000 acres (fig. 8).

The acreage in the softwood forest types—white pine, spruce, and loblolly-shortleaf pine—decreased by about 300,000 acres. In 1949 the area in softwood types made up almost 11 percent of the commercial forest-land area, but by 1961 the percentage had dropped to 6 percent of the total. Most of the decrease in acreage was in the loblolly-shortleaf pine type.

Growing-Stock Volume

Growing-stock volume increased by almost 5 billion cubic feet during the 12 years between surveys. This is almost an 80-percent increase. Most of the increase was in the hardwood species; the volume of softwoods increased only 11 percent.

Total volume in sawtimber trees doubled, from 3.3 to 6.6 billion cubic feet; and in the 12-inch, 14-inch, and 16-inch d.b.h. classes the volumes more than doubled (fig. 9). The volume in

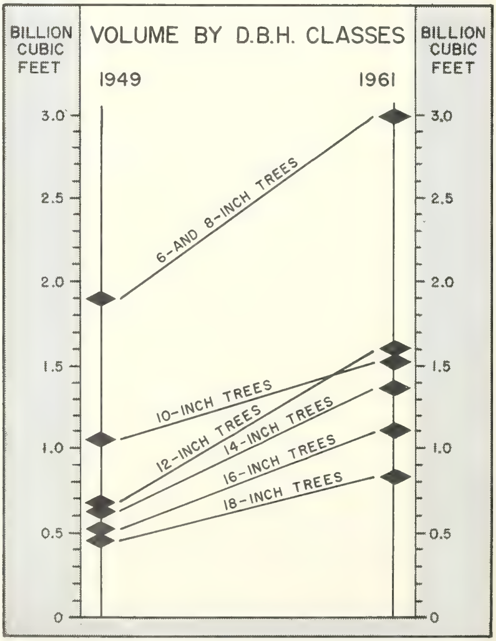


Figure 9.—The volume in the 12-, 14-, and 16-inch d.b.h. classes more than doubled in 12 years.

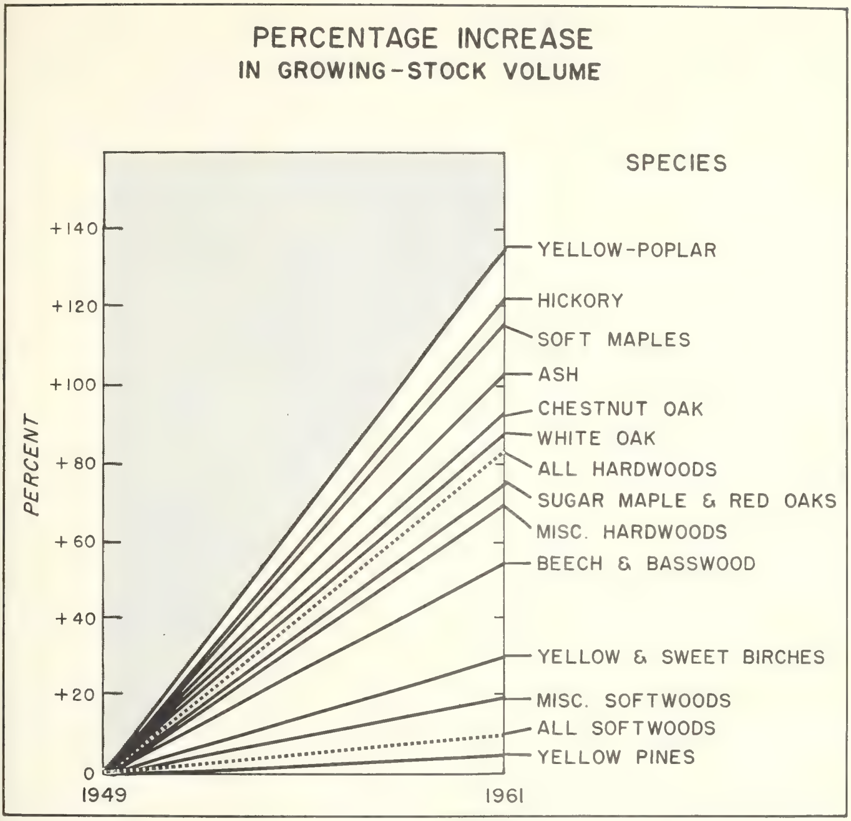


Figure 10.—Some species more than doubled in cubic-foot volume during the 12-year period.

poletimber trees increased by more than 1½ billion cubic feet, 56 percent more than it was in 1949.

Growing-stock volume in red oaks increased greatly—more than 1 billion cubic feet. Next largest gain in volume was by yellow-poplar, which had an increase of 600 million cubic feet. Chestnut oak and hickory closely followed yellow-poplar, each with an increase of more than 500 million cubic feet.

Yellow-poplar, however, had the greatest increase in terms of percentage (137 percent) and was followed by hickory and red maple—123 and 118 percent, respectively (fig. 10). The average increase for all hardwoods combined was 85 percent.

Sawtimber Volume

Sawtimber volume increased by almost 11¼ billion board feet between the two surveys, an increase of almost 65 percent. One-half of this increase (5.6 billion board feet) was in sawtimber trees of less than 15.0 inches d.b.h. These trees increased in board-foot volume by 92 percent. This increase was due partially to the large amount of ingrowth (volume of trees that became sawtimber size during the period).

Changes in sawtimber volume on commercial forest land in West Virginia, by diameter-class groups, were as follows:

D.b.h. class (inches)	*1949 (billion board feet)*	*1961 (billion board feet)*	*Increase (percent)*
Under 15.0	6.1	11.7	92
15.0 to 18.9	5.2	8.7	67
19.0 to 28.9	5.5	7.6	37
29.0 and over	.7	.7	—

Sawtimber volume in red oaks increased by more than 2 billion board feet—a 44 percent increase (fig. 11). Yellow-poplar,

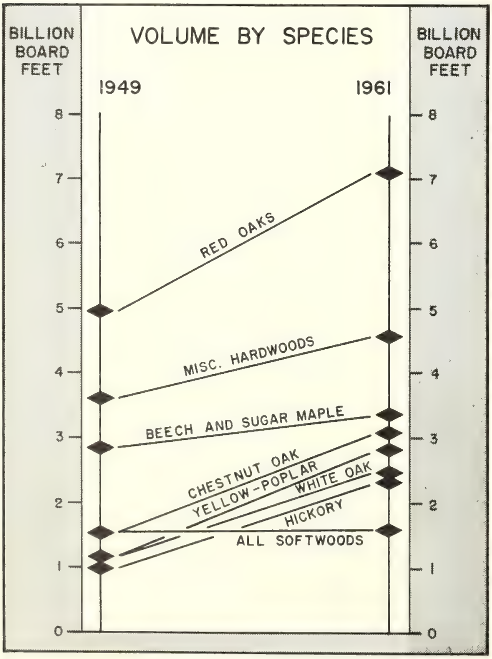


Figure 11.—The volume in red oak sawtimber trees increased by more than 2 billion board feet.

chestnut oak, hickory, and white oak doubled in board-foot volume, an increase of more than 1 billion board feet each. Red maple, ash, and black cherry also more than doubled in board-foot volume during the 12-year period.

The quality of sawtimber in West Virginia is about the same as it was estimated on the previous survey. The board-foot volume of standard-lumber logs in grades 1 and 2 increased in about the same proportion as the forest inventory.

The oak species made up a greater proportion of these better quality classes in 1961 than any of the other hardwood species. Board-foot volume for grades 1 and 2 standard-lumber logs of all oaks increased by about 1.5 billion board feet (a little more than 50-percent increase). The volumes in these same grades for hickory increased by 360 million board feet, and for yellow-poplar 420 million board feet. Total volume of all hardwood species in the better quality grades increased by 2.8 billion board feet.

In 1961, grades 1 and 2 of all hardwood sawtimber volume made up 31 percent of the total, and in 1949 they made up 34 percent (fig. 12). Yellow-poplar sawtimber volume in grades 1 and 2 made up 30 percent of the total in 1961, but in 1949 these grades accounted for 38 percent. The same grades for white pine and the yellow pines accounted for 42 percent of the total volume for these species in 1961 and 39 percent in 1949.

Pines were the only softwoods graded into standard-lumber log classes. If the sawtimber volume of pines less than 13.0 inches d.b.h. were excluded (it is impossible for softwood trees of this size to have a grade 1 sawlog because of the minimum log-diameter specifications), the percentage of board-foot volume in grade 1 would increase from 17 percent to 38 percent of the total.

All the hardwood species were graded. If the sawtimber volume of hardwoods less than 15.0 inches d.b.h. were excluded (it is impossible for hardwood trees of this size to have a grade-1 sawlog because of the minimum log-diameter specifications), the percentage of board-foot volume in grade 1 would increase from 10 percent to 17 percent of the total.

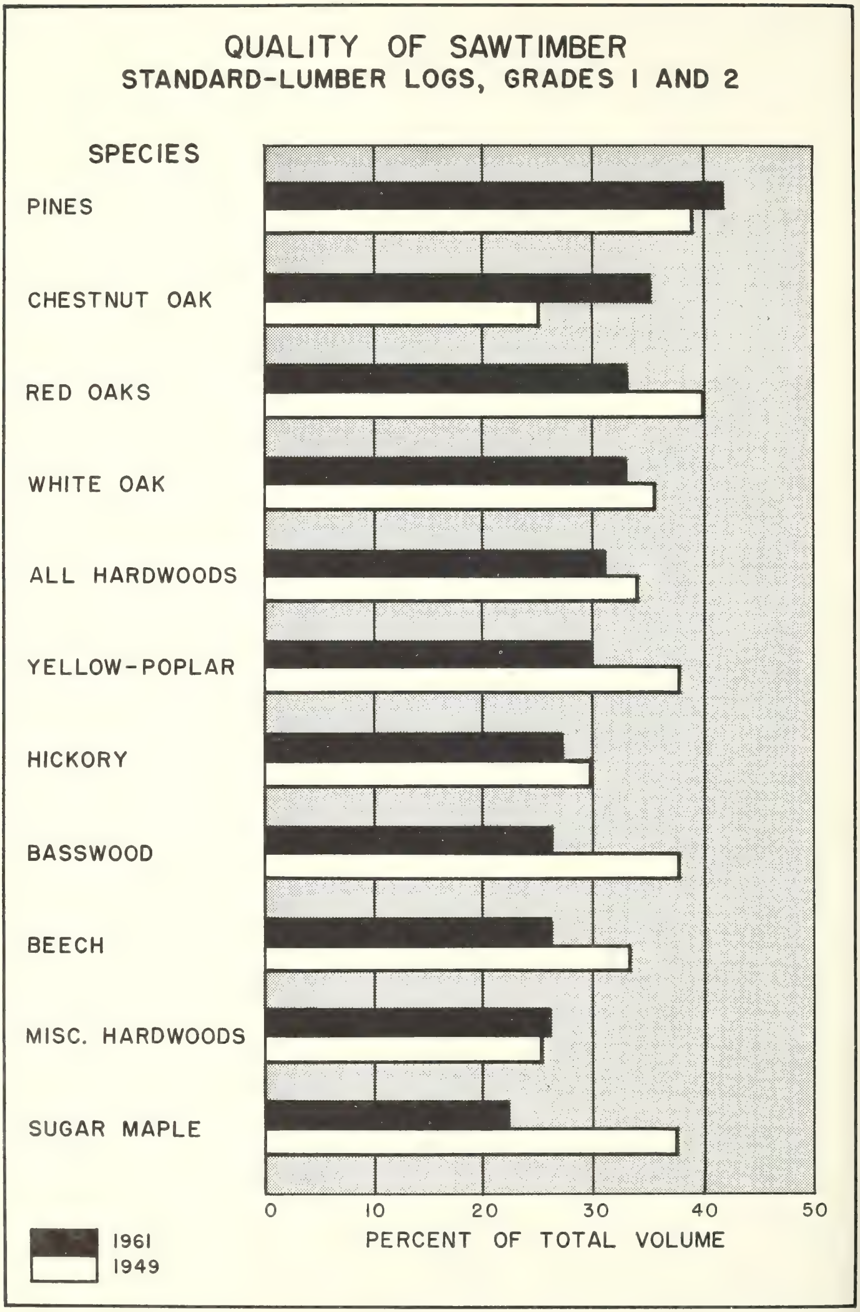


Figure 12.—The percentage of total board-foot volume in the better standard-lumber grade logs dropped for most species.

The changes that have been pointed out are the differences between two surveys; a few are affected by changes in definitions and are not necessarily trends. West Virginia will be resurveyed periodically (about every 10 to 15 years); and as each resurvey is completed, additional data will be available to show reliable trends in all important timber statistics.

The Resource Explosion

The statistics presented in this report reflect an *explosion* of timber supply in West Virginia during the 12-year period between surveys. Like an explosion, it was not all under control—loss in softwood volume, some loss in timber quality, excess proportion of ingrowth, a build-up of large volumes in the less desirable species. Yet all in all, the timber basket has filled at an unprecedented rate.

This explosion of the timber supply is partly a result of natural biologic phenomena—this 12-year period coincided with that portion of the life history of forests where changes occur rapidly. The marked increase in timber was also the result of man's influence on the forest—fire control, timber-stand improvement, tree planting, and application of management practices.

One result of this new plateau of timber supply is that future efforts to alter it can be more intensive. For example, more attention can be paid to changing species composition, stand structure, and quality distribution. Criteria of site productivity, accessibility to roads, proximity to markets, and community needs will probably affect priorities of timber-stand-improvement work. In other words, forestry activities can become more selective.

A major effect of this change in the timber basket is to accelerate the shift in attention to marketing and utilizing this present and potential resource.[2] Persons concerned with the timber budget in West Virginia have always weighed questions of supply and demand. In 1949, there were obvious supply problems that merited immediate and critical attention. Now we may expect increased interest in timber demand. Since timber is a market product, policy makers will always be concerned with programs that affect both supply and demand. The swing of the pendulum merely indicates changes in emphasis.

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[2] Hagenstein, Perry R. THE LOCATION DECISION FOR WOOD-USING INDUSTRIES IN THE NORTHERN APPALACHIANS. U.S. Forest Serv. Res. Paper NE-16, 36 pp. Northeast. Forest Expt. Sta., Upper Darby, Pa., 1964.

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Appendix

DEFINITIONS OF TERMS

Forest Area

Forest land area. — This includes: (a) lands that are at least 10 percent stocked with trees of any size and are capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and that has not been developed for other use; and (c) afforested areas. (Forest tracts of less than 1 acre, isolated strips of timber less than 120 feet wide, and abandoned fields and pastures not yet 10 percent stocked with trees are excluded.)

Commercial forest land area. — Forest land that is (a) producing, or physically capable of producing, crops of industrial wood (usually sawtimber); (b) economically available now or prospectively; and (c) not withdrawn from timber utilization through statute, ordinance, or administrative order.

Noncommercial forest land area. — Forest land that is (a) withdrawn from timber utilization through statute, ordinance, or administrative order, but that otherwise qualifies as commercial forest land; or (b) incapable of yielding industrial wood products (usually sawtimber) because of adverse site conditions.

Timber Volume

Growing stock.—Net volume, in cubic feet, of live sawtimber and poletimber trees (see definitions under *Class of Timber*) from stump to a minimum 4-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot.

Sawtimber volume. — Net volume in board feet, International ¼-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Standard cord. — A unit of measure for stacked wood encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates by applying a factor of 80 cubic feet of wood (inside bark) per rough cord.

Tree Classes

All trees.—All live sawtimber and poletimber trees, seedlings and saplings, and all live cull trees.

Growing-stock trees.—All live sawtimber trees, poletimber trees, and seedlings and saplings, except cull trees. (See definitions under *Class of Timber*).

Desirable trees.—All growing-stock trees that now or prospectively have positive stumpage value (primarily for lumber production) and are likely to remain in the stand for at least 10 years if not cut or otherwise deliberately killed.

Sawtimber trees are considered to have positive stumpage value now if they have a grade 1 or 2 butt log. Exceptions are made for several species that can have a lower quality butt log.

Poletimber trees are considered to have positive stumpage value if they will meet the above sawtimber tree requirements before becoming mature.

Stand-Size Classes

Stand.—A growth of trees on a minimum of 1 acre of forest land that is at least 10 percent stocked by forest trees of any size.

Sawtimber stands.—Stands that are at least 10 percent stocked with growing-stock trees and have half or more of this stocking in sawtimber and poletimber trees, with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands that are at least 10 percent stocked with growing-stock trees and have half or more of this stocking in sawtimber and poletimber trees, with poletimber stocking exceeding that of sawtimber stocking.

Seedling-and-sapling stands.—Stands that are at least 10 percent stocked with growing-stock trees and in which saplings and/or seedlings make up a plurality of this stocking.

Nonstocked areas.—Commercial forest lands that are less than 10 percent stocked with growing-stock trees.

Area-Condition Classes

Class 1.—Areas that are stocked 70 percent or more with desirable trees.

Class 2.—Areas that are stocked 40 to 70 percent with desirable trees and in which 30 percent or less of the area is controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Class 3.—Areas that are stocked 40 to 70 percent with desirable trees and in which more than 30 percent of the area is controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Class 4.—Areas that are stocked less than 40 percent with desirable trees and have adequate seed sources and seedbeds favorable to natural restocking.

Class 5.—Areas that are stocked less than 40 percent with desirable trees and have inadequate seed sources and/or seedbeds unfavorable to natural regeneration.

Forest Cover Types

The forest-type classification of each sample plot is based upon the majority of stocking by all live trees of various species. When no indicator species makes up a majority, the forest type is determined on the basis of plurality of stocking.

White pine.—Forests in which 50 percent or more of the stand is eastern white pine. In West Virginia it includes a small acreage in the hemlock type.

Spruce.—Forests in which 50 percent or more of the stand is spruce.

Loblolly-shortleaf pine.—Forests in which 50 percent or more of the stand is loblolly pine, shortleaf pine, or other southern yellow pines, singly or in combination.

Oak-pine.—Forests in which 50 percent or more of the stand is hardwood, usually upland oaks, but in which southern pines make up 25-49 percent of the stand.

Oak-hickory.—Forests in which 50 percent or more of the stand is upland oaks or hickory, singly or in combination, except where pines comprise 25-49 percent, in which case the stand would be classified oak-pine. In West Virginia, it includes a considerable acreage of the cove-hardwood forest type (yellow-poplar and/or its associates).

Oak-gum.—Bottomland forests in which 50 percent or more of the stand is blackgum, sweetgum, or oaks, singly or in combination, except where pines comprise 25-49 percent, in which case the stand would be classified as oak-pine.

Elm-ash-cottonwood.—Forests in which 50 percent or more of the stand is elm, ash, cottonwood, or red maple, singly or in combination. In West Virginia, it includes a small acreage of the aspen-birch forest type.

Maple-beech-birch.—Forests in which 50 percent or more of the stand is sugar maple, beech, or yellow birch, singly or in combination.

Class of Timber

Sawtimber trees.—Trees of commercial species that: (a) are of the following minimum diameters at breast height—softwoods 9.0 inches and hardwoods 11.0 inches; and (b) contain at least one merchantable sawlog. (A merchantable sawlog is a portion of a live tree that meets the minimum log-grade specifications, as defined under log-grade classification. The sawlog portion is that part of the tree between the stump and the top of the last merchantable sawlog.)

Poletimber trees.—Trees of commercial species that meet regional specifications of soundness and form, and are of the following diameters at breast height; softwoods 5.0 to 9.0 inches; hardwoods 5.0 to 11.0 inches. Such trees will usually become sawtimber trees if left to grow.

Seedling-and-sapling trees.—Trees of commercial species less than 5.0 inches in diameter at breast height and of good form and vigor.

Cull trees.—Live trees of sawtimber or poletimber size that are unmerchantable for sawlogs now or prospectively because of defect or rot, or because they are of noncommercial species.

Log Grades

The standard log grades for hardwoods, white pine, and yellow pines used in the resurvey of West Virginia are outlined in figures 13 to 16.

Annual Growth and Cut

Net annual growth of sawtimber.—The annual change (resulting from natural causes) in net board-foot volume of live sawtimber on commercial forest land during the period between surveys.

Ingrowth of sawtimber.—The net board-foot volume of trees that first became sawtimber trees during the inventory year as measured at the end of the year.

Annual mortality of sawtimber.—The net board-foot volume removed

HARDWOOD STANDARD-LUMBER LOGS

*Grade Factors**		*Specifications*							
		Log grade 1			*Log grade 2*				*Log grade 3*
Position in tree		Butts only	Butts & uppers		Butts & uppers				Butts & uppers
Minimum diameter (inches)		[1] 13-15	16-19	20+	[2] 11	12+			8+
Minimum length (feet)		10+	10+	10+	10+	8-9	10-11	12+	8+
Clear** cuttings on each of the 3 best faces	Min. length (feet)	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	—
	Min. yield face length	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Max. sweep and crook allowance; % of gross vol.		15			30				50
Max. cull and sweep allowance; % of gross vol.		[3] 40			[4] 50				50

*End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in U.S. Forest Prod. Lab. Rpt. D1737.

**A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.

[1] Ash and basswood butts can be 12 inches if otherwise meeting the requirements for small No. 1's.

[2] 10-inch logs of all species can be No. 2 if otherwise meeting the requirements for small No. 1's.

[3] Otherwise No. 1 logs with 41-50 percent cull can be No. 2.

[4] Otherwise No. 2 logs with 51-60 percent cull can be No. 3.

Figure 13.—The specifications used in the forest survey of West Virginia for hardwood standard-lumber logs, based on U.S. Forest Products Laboratory studies.

yearly from live sawtimber on commercial forest land through death from natural causes.

Annual cut of live sawtimber.—The net board-foot volume of live sawtimber trees cut or killed in logging, land-clearing, or cultural operations on commercial forest land during a year.

Net annual growth of growing stock.—The annual change (resulting from natural causes) in net cubic-foot volume of live sawtimber and poletimber trees on commercial forest land.

HARDWOOD TIE-AND-TIMBER LOGS

Grade Factors		*Specifications*
Position in tree		Butts and uppers
Scaling diameter (inches)		8+
Length, without trim (feet)		8+
Clear cuttings		No requirements. Not graded on cutting basis.
Max. sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar* diameter that is more than one-third of log diameter at point of occurrence.
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound** surface defects permitted		Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.

*Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

**Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

Figure 14.—The timber-grading specifications used for hardwood tie and construction timber.

WHITE PINE AND RED PINE LOGS

Grade	*D.i.b. small end (inches)*	*Length w/o trim (feet)*	*Total* deduction permitted*	*Surface requirements*
1	13+	8+	None	Surface clear 100%.
	13-16	12-16	25%	Must be 2/3 surface clear in lengths 8′ long or longer; or 50% surface clear full length.
	17+	10-16	30%	Must be 1/2 surface clear in lengths 8′ long or longer; or 25% surface clear full length.
2				All knots for Grade 2 logs must be sound and tight.
	9-16	10+	30%	Knots not over 2.5″ in diameter. Larger knots permitted only if 50% full length surface with knots not larger than 2.0″ in diameter.
	17+	8+	40%	Knots not over 3.0″ in diameter. Larger knots permitted only if 50% full length surface with knots not larger than 2.5″ in diameter.
3	6-7	8+	25%	Sound knots not over 1″ in diameter; or live knots not over 2.0″ in diameter.
	8-13	8+	30%	No surface requirements, except logs with knots 4″ or more in diameter in whorls less than 2′ apart will not be accepted unless 25% or more full length surface with sound knots not over 2″ in diameter.
	14+	8+	40%	No surface requirements, except that knots over 6″ in diameter cannot be closer than 3′ apart.

*Total deduction includes sweep, rot, and other cull.

Figure 15.—The timber-grading specifications used in the forest survey of West Virginia for white pine and red pine lumber logs.

Ingrowth of growing stock.—The total net cubic-foot volume of trees that first become a part of growing stock during the inventory year as measured at the end of the year.

Annual mortality of growing stock.—The net cubic-foot volume removed from growing stock during a year through death from natural causes.

Annual cut of growing stock.—The net cubic-foot volume of live sawtimber and poletimber trees cut or killed in logging, land-clearing, or cultural operations on commercial forest land during a year.

YELLOW PINE LOGS

Grade	*Diameter (in inches, inside bark)*	*Length (feet)*	*Surface requirements*
1	10-16	8+	Surface clear (not considering adventitious knots or branches).
	16+	8+	Not more than three 2- to 4-inch knots and any number of smaller knots.
2	8-9	8+	Surface clear.
	10-13	8+	Any number of small knots (less than 2 inches in diameter).
	14+	8+	Not more than six 2- to 4-inch knots and any number of smaller knots.
3	6-7	8+	Any number of small knots not exceeding 1-inch in diameter.
	8-13	8+	Not more than six 2- to 4-inch knots and any number of smaller knots.
	14+	8+	More than six 2- to 4-inch knots. Any log with one or more knots 5 inches or larger.
	Knotty or crooked merchantable logs 8 inches d.i.b. or larger and 10 feet in length or longer that do not fall in either Grade 1 or Grade 2.		

Figure 16.—The grade standards used for yellow pine logs in the forest survey of West Virginia.

FOREST-SURVEY METHODS

Our estimates of forest area and timber volumes are based upon information obtained from two sets of aerial photographs (10 or more years between the two) and sample photo and ground plots. Photo plots were pin-pointed on each set of aerial photographs so they were distributed uniformly over the entire State. Each photo plot was classified as either forest or nonforest, and each forest plot was classified into sampling strata. These strata were stand-size classes on the initial survey and were cubic-foot-volume-per-acre classes on the resurvey.

Field crews on the first survey inspected on the ground many sample plots selected from the photo plots. Area, volume, and growth data were recorded. This set of data was the basis for the report *Forest Statistics for West Virginia,* which was published in 1952.

A sample of 346 of the initial ground plots were visited on the resurvey. Plot centers were relocated and trees were retallied. The two tallies were reconciled with each other on the plot.

The data for all plots on the initial survey and both sets of data for the remeasured plots were used in an electronic computer to obtain the first part of a combined estimate of current forest area and timber volume, and estimates of net annual growth, mortality, and timber cut. Regression equations calculated from the remeasured plots brought up to date the volume estimates of the first survey.

In addition to the remeasured plots, 1,201 new ground plots selected from photo plots on the most recent aerial photographs were established. They were selected at random within cubic-foot volume classes. The data for photo plots and ground plots based upon the most recent aerial photography were used by the electronic computer to obtain the second part of the combined estimates for area and volume.

These two sets of estimates were weighted by their variance reciprocals and combined within the computer. The printed output from the computer gave the combined estimate in acres for each forest area breakdown shown in the tables in this report. The associated sampling errors for these breakdowns were also printed. The combined estimates of timber volumes were produced in the same way.

Estimates of net annual growth, mortality, and timber cut were based entirely upon the 346 remeasured plots. The volume of timber on the plots at time of remeasurement (consisting of volume of live growing-stock trees plus volume of trees that were cut) minus the volume of timber on the plots (growing-stock trees only) at time of the first survey equals net volume growth for the years between measurements.

Stump measurements were used to estimate volumes of cut trees. Measurement of dead trees that were initially classified as live growing-stock trees provided the estimates of mortality.

These estimates for the period between surveys were converted to net annual growth, mortality, and timber cut by dividing by the number of years between measurements for each plot.

RELIABILITY OF THE ESTIMATES

The forest-area and timber-volume data presented in this report are based on a carefully designed sample of forest conditions throughout West Virginia. However, since neither every acre nor every tree in the State was measured, the figures in this report are at best estimates. A measure of the reliability of these estimates is given by a *sampling error.* Each estimate in this report had a computed sampling error. Included with the statistical tables are the corresponding sampling errors for row totals and column totals.

Briefly, here is how the sampling error indicates reliability. Our report of the total commercial forest area in West Virginia, 11,389,000 acres, has an associated sampling error of 0.7 percent (80,000 acres). This means that our best estimate of the commercial forest area in 1961 is 11,389,000 acres. And if there are no errors in procedure, the odds are 2 to 1 that, if we repeated the resurvey, the new estimate of commercial forest area would be between 11,309,000 and 11,469,000 acres (11,389,000 ± 80,000). Similarly, the odds are 19 to 1 that it would be within ± 160,000 acres of the present estimate, and 300 to 1 that it would be within ± 240,000 acres.

The computed sampling error is not a complete measure of reliability; there are other sources of error that this term does not include. There could be imperfections in our volume tables and errors in field measurement. Procedural errors were kept to a minimum by careful training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Computed sampling errors for the totals shown in the statistical tables are:

	Sampling error (percent)
Commercial forest area (11,389,000 acres)	0.7
Growing-stock volume (11,060,725,000 cubic feet)	1.5
Sawtimber volume (28,779,503,000 board feet)	2.4
Net annual growth (370,288,000 cubic feet)	5.0
Annual timber cut (118,986,000 cubic feet)	18.0

SPECIES TALLIED

Only the commercial tree species[3] found on forest survey sample plots in West Virginia are listed below. Other species that are found in West Virginia are not included.

Softwoods

Shortleaf pine	*Pinus echinata*
Pitch pine	*Pinus rigida*
Virginia pine	*Pinus virginiana*

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[3] Little, Elbert L. Jr. CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). U.S. Dept. Agr., Agr. Handbook 41, 472 pp., 1953.

Spruce:	
Red spruce	*Picea rubens*
Black spruce	*Picea mariana*
Eastern hemlock	*Tsuga canadensis*
Other eastern softwoods:	
Eastern white pine	*Pinus strobus*
Table-Mountain pine	*Pinus pungens*
Eastern redcedar	*Juniperus virginiana*

Hardwoods

Select white oaks:	
White oak	*Quercus alba*
Select red oaks:	
Northern red oak	*Quercus rubra*
Other white oaks:	
Chestnut oak	*Quercus prinus*
Other red oaks:	
Black oak	*Quercus velutina*
Scarlet oak	*Quercus coccinea*
Hickory	*Carya* species
Yellow birch	*Betula alleghaniensis*
Sweet birch	*Betula lenta*
Sugar maple	*Acer saccharum*
Red maple	*Acer rubrum*
American beech	*Fagus grandifolia*
Blackgum	*Nyssa sylvatica*
Ash	*Fraxinus* species
American basswood	*Tilia americana*
Yellow-poplar	*Liriodendron tulipifera*
Black cherry	*Prunus serotina*
Cucumbertree	*Magnolia acuminata*
Black walnut	*Juglans nigra*
Other eastern hardwoods:	
Silver maple	*Acer saccharinum*
Ohio buckeye	*Aesculus glabra*
Yellow buckeye	*Aesculus octandra*
River birch	*Betula nigra*
Hackberry	*Celtis occidentalis*
Honeylocust	*Gleditsia triacanthos*
Butternut	*Juglans cinerea*
Sweetgum	*Liquidambar styraciflua*
American sycamore	*Platanus occidentalis*
Bigtooth aspen	*Populus grandidentata*
Quaking aspen	*Populus tremuloides*
Black locust	*Robinia pseudoacacia*
Black willow	*Salix nigra*
Elm	*Ulmus* species

STATISTICAL DATA

Tables of statistical data for forest area, timber volume, annual growth, and cut for the entire State (National Standard Tables) and associated sampling errors for subtotals and totals appear first.

These are followed by a series of tables that give statistics for each of the four geographical sampling units. After these are tables of county statistics within each of the sampling units and combined statistics for counties in more than one sampling unit.

These county estimates have been prepared for users who wish statistics for a county or group of counties to meet their own particular needs. Estimated sampling errors for county totals are shown (but the actual errors may be larger or smaller). The users of these data are urged to evaluate the sampling error for each total in relation to their planning needs, use of the data, and decisions based upon these data.

County statistics were computed from means and variances of seven volume strata (stratified from aerial photographs) for the geographic unit. These were applied to the volume strata within each county, assuming homogeneous forest conditions throughout each stratum. If homogeneity does not exist, the actual errors of some county estimates may be greater than the calculated sampling errors.

Table 1. — ***Land area of West Virginia, by classes of land, 1961***

Land class	Area	
	Acres	*Percent*
Commercial forest land	11,389,000	74
Unproductive forest land	34,000	([1])
Productive-reserved forest land	46,000	([1])
Total forest land	11,469,000	74
Nonforest land	[2] 3,942,000	26
All land	[3] 15,411,000	100

Note: Sampling errors for major breakdowns of area are given in table 10.

[1] Less than 1 percent.

[2] Includes 68,000 acres of water according to survey standards of area classification but defined by the Bureau of the Census as land.

[3] From U. S. Bureau of the Census, Land and Water Areas of the United States, 1960.

Table 2. — *Area of commercial forest land in West Virginia, by ownership classes, 1961*

Ownership class	Area	
	Acres	*Percent*
National forest	[1] 869,000	8
Miscellaneous Federal	14,000	(2)
State	144,000	1
County and municipal	9,000	(2)
Forest industry:		
Pulp and paper	172,000	2
Lumber	342,000	3
Other	16,000	(2)
Total forest industry	530,000	5
Farmer-owned	2,821,000	25
Miscellaneous private	7,002,000	61
All ownerships	11,389,000	100

[1] Includes 774,589 acres of commercial forest land in the Monongahela National Forest and 94,422 acres of commercial forest land in the George Washington National Forest.

[2] Less than 1 percent.

Table 3. — *Area of commercial forest land in West Virginia, by stand-size and ownership classes, 1961*

(In thousands of acres)

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and misc. private
Sawtimber stands	5,605	534	72	301	4,698
Poletimber stands	3,105	312	50	169	2,574
Sapling-and-seedling stands	2,445	23	25	55	2,342
Nonstocked areas	234	0	20	5	209
All classes	11,389	869	167	530	9,823

Table 4. — *Area of commercial forest land in West Virginia, by stand-volume classes for sawtimber and other stand-size classes, 1961*
(In thousands of acres)

Stand volumes per acre (board feet[1])	Area by stand-size classes		
	All stands	Sawtimber stands	Other stands
Less than 1,500	5,007	383	4,624
1,500 to 5,000	4,561	3,401	1,160
More than 5,000	1,821	1,821	0
All classes	11,389	5,605	5,784

[1] Net volume, International ¼-inch rule.

Table 5. — *Area of commercial forest land in West Virginia, by stocking classes based on alternative stand components, 1961*
(In thousands of acres)

Stocking class (percent)	Stocking classified in terms of —		
	All trees	Growing-stock trees	Desirable trees
90 to 100	9,713	2,075	202
80 to 90	694	2,825	546
70 to 80	407	2,336	885
60 to 70	290	1,337	1,038
50 to 60	96	1,238	1,653
40 to 50	63	705	1,536
30 to 40	48	379	1,603
20 to 30	18	179	1,588
10 to 20	15	81	1,521
Less than 10	45	234	817
All areas	11,389	11,389	11,389

Table 6. — *Area of commercial forest land in West Virginia, by stocking classes of growing-stock trees and stand-size classes, 1961*
(In thousands of acres)

Stocking class (percent)	All stands	Sawtimber stands	Poletimber stands	Sapling-and-seedling stands	Non-stocked stands
70 or more	7,236	4,001	2,156	1,079	—
40 to 70	3,280	1,467	711	1,102	—
10 to 40	639	137	238	264	—
Less than 10	234	—	—	—	234
All classes	11,389	5,605	3,105	2,445	234

Table 7. — *Area of commercial forest land in West Virginia, by area-condition and ownership classes, 1961*
(In thousands of acres)

Area-condition class	All ownerships	National forest	Other public	Forest industry	Farmer and misc. private
1	1,633	103	18	66	1,446
2	681	137	7	0	537
3	3,546	216	27	151	3,152
4	2,231	113	55	221	1,842
5	3,298	300	60	92	2,846
All classes	11,389	869	167	530	9,823

Table 8. — *Area of commercial forest land in West Virginia, by growth-per-acre and ownership classes, 1961*

(In thousands of acres)

Growth-per-acre class (cubic feet)	All ownerships	National forest	Other public	Forest industry	Farmer and misc. private
120 or more	169	113	12	([1])	44
85 to 120	647	438	12	26	171
50 to 85	1,965	290	31	336	1,308
Less than 50	8,608	28	112	168	8,300
All classes	11,389	869	167	530	9,823

[1] The small acreage of forest-industry land in the growth-per-acre classes of more than 85 cubic feet is due partly to the small number of remeasured sample plots in this ownership class. The actual acreage is probably greater than shown.

Table 9. — *Area of commercial forest land in West Virginia, by forest types and ownership classes, 1961*

(In thousands of acres)

Forest type	All ownerships	Public ownerships	Private ownerships
White pine	89	16	73
Spruce	27	27	0
Loblolly-shortleaf pine	584	52	532
Oak-pine	115	0	115
Oak-hickory[1]	7,477	411	7,066
Oak-gum	148	3	145
Elm-ash-cottonwood[2]	611	15	596
Maple-beech-birch	2,338	512	1,826
All types	11,389	1,036	10,353

[1] Includes the yellow-poplar forest type.

[2] Includes a small acreage of the aspen-birch forest type.

Table 10. — *Sampling errors for major area breakdowns in West Virginia, 1961*

Table No.	Area breakdown classification	Sampling error
		Percent
1.	Forest land area:	
	Commercial	1
	Unproductive	9
	Total	1
2.	Ownership[1]:	
	Pulp and paper industry	23
	Lumber industry	16
	Other forest industry	79
	Total forest industry	13
	Farmer-owned	5
	Miscellaneous private	2
	Farmer and misc. private	1
3.	Stand-size class:	
	Sawtimber	2
	Poletimber	4
	Sapling and Seedling	5
	Nonstocked	57
4.	Stand-volumes per acre:	
	Less than 1,500 board feet	3
	1,500 to 5,000 board feet	3
	More than 5,000 board feet	5
6.	Stocking class:	
	70 percent or more	2
	40 to 70 percent	6
	10 to 40 percent	19
	Less than 10 percent	46
7.	Area-condition class:	
	1	4
	2	8
	3	4
	4	9
	5	7
8.	Growth-per-acre class:	
	120 cubic feet or more	31
	85 to 120 cubic feet	20
	50 to 85 cubic feet	14
	Less than 50 cubic feet	3
9.	Forest types:	
	White pine	21
	Spruce	31
	Loblolly-shortleaf pine	12
	Oak-pine	28
	Oak-hickory	2
	Oak-gum	36
	Elm-ash-cottonwood	12
	Maple-beech-birch	5

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[1] No sampling errors are shown for public ownership because acreages were obtained from public records.

Table 11. — *Number of growing-stock trees on commercial forest land in West Virginia, by diameter classes and by softwoods and hardwoods, 1961*

D.b.h. class (inches)	All species		Softwoods	Hardwoods
	Sampling error	Number of trees		
	Percent	*Thousands*	*Thousands*	*Thousands*
1.0 - 2.9	2	1,384,847	123,142	1,261,705
3.0 - 4.9	2	792,729	63,160	729,569
5.0 - 6.9	3	455,176	32,975	422,201
7.0 - 8.9	3	230,304	18,393	211,911
9.0 - 10.9	3	137,000	11,483	125,517
11.0 - 12.9	3	79,449	5,313	74,136
13.0 - 14.9	3	49,898	2,265	47,633
15.0 - 16.9	4	28,038	1,358	26,680
17.0 - 18.9	4	17,434	708	16,726
19.0 - 28.9	4	19,873	419	19,454
29.0 - 38.9	11	816	10	806
39.0 and larger	39	54	0	54
All classes	2	3,195,618	259,226	2,936,392

Table 12.—*Number of cull trees on commercial forest land in West Virginia, by diameter groups and by softwoods and hardwoods, 1961*

D.b.h. class (inches)	Number of cull trees
	Thousands
Softwoods:	
5.0 - 8.9	5,546
9.0 - 18.9	2,974
19.0 and larger	753
Total	9,273
Hardwoods:	
5.0 - 10.9	63,034
11.0 - 18.9	36,696
19.0 and larger	10,015
Total	109,745
All species	119,018

Table 13. — *Volume of timber on commercial forest land in West Virginia, by class of timber and by softwoods and hardwoods, 1961*
(In millions of cubic feet)

Class of timber*	All species	Softwoods	Hardwoods
Sawtimber trees:			
Sawlog portion	6,199	329	5,870
Upper-stem portion	434	38	396
Total	6,633	367	6,266
Poletimber trees	4,428	199	4,229
All growing-stock trees	11,061	566	10,495
Sound cull trees:			
Sawtimber size	182	13	169
Poletimber size	61	3	58
Total	243	16	227
Rotten cull trees:			
Sawtimber size	521	3	518
Poletimber size	179	1	178
Total	700	4	696
Total, all timber	12,004	586	11,418

* The item "salvable trees" is not included here because there is only negligible volume of this class of timber in West Virginia.

Table 14.—*Volume of growing stock and sawtimber on commercial forest land in West Virginia, by ownership classes and by softwoods and hardwoods, 1961*

Ownership class	Growing stock, million cubic feet			Sawtimber, million board feet[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National forest	1,215	136	1,079	2,893	442	2,451
Other public	442	32	410	1,074	116	958
Forest industry	633	22	611	1,620	58	1,562
Farmer and misc. private	8,771	376	8,395	23,192	980	22,212
All ownerships	11,061	566	10,495	28,779	1,596	27,183

[1] International ¼-inch rule.

Table 15.—*Volume of growing stock and sawtimber on commercial forest land in West Virginia, by stand-size classes and by softwoods and hardwoods, 1961*

Stand-size class	Growing stock, million cubic feet			Sawtimber, million board feet[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Sawtimber stands	7,656	342	7,314	24,081	1,158	22,923
Poletimber stands	2,761	166	2,595	3,617	351	3,266
Sapling-and-seedling stands	572	52	520	1,081	87	994
Nonstocked areas	72	6	66	0	0	0
Total	11,061	566	10,495	28,779	1,596	27,183

[1] International ¼-inch rule.

Table 16.—*Volume of growing stock on commercial forest land in West Virginia, by species and diameter classes, 1961*
(In millions of cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0+
Shortleaf pine	63	15	17	10	9	6	3	1	2	—	—
Pitch and Virginia pines	234	34	46	45	48	28	19	6	8	—	—
Spruce	67	11	12	13	12	9	7	3	—	—	—
Hemlock	125	22	18	10	13	13	14	17	16	2	—
White pine[1]	77	11	13	13	11	9	8	7	5	—	—
Total softwoods	566	93	106	91	93	65	51	34	31	2	—
Select white oaks	935	119	122	129	153	130	73	63	128	14	4
Select red oaks	1,265	152	159	164	157	157	129	104	216	25	2
Other white oaks	1,161	156	155	158	172	132	100	84	175	22	7
Other red oaks	1,076	77	91	97	163	152	153	119	212	12	—
Hickory	1,007	147	157	151	158	120	89	68	108	9	—
Yellow birch	168	36	27	21	14	13	12	10	31	3	1
Sweet birch	194	26	30	28	25	21	20	13	29	2	—
Sugar maple	596	115	90	75	58	49	43	38	118	9	1
Red maple	568	126	114	101	59	48	36	25	52	7	—
Beech	653	55	67	83	91	92	73	58	123	11	—
Blackgum	173	8	10	16	24	24	23	23	45	—	—
Ash	229	44	39	36	31	26	21	12	20	—	—
Basswood	331	28	46	46	50	45	33	27	56	—	—
Yellow-poplar	1,040	111	127	159	168	152	137	83	99	4	—

Black walnut	99	13	12	16	11	12	12	9	13	1	—
Other hardwoods	596	140	114	84	77	62	37	26	55	1	—
Total hardwoods	10,495	1,390	1,410	1,429	1,495	1,291	1,040	790	1,515	120	15
All species	11,061	1,483	1,516	1,520	1,588	1,356	1,091	824	1,546	122	15

[1] Includes about 4 million cubic feet of other softwood species.

Table 17.—*Volume of sawtimber on commercial forest land in West Virginia, by species and diameter classes, 1961*

(In millions of board feet)[1]

Species	Diameter class (inches at breast height)								
	All classes	9.0- [2]10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 28.9	29.0- 38.9	39.0+
Shortleaf pine	120	36	33	23	13	6	9	—	—
Pitch and Virginia pines	677	219	191	121	80	28	38	—	—
Spruce	191	62	46	38	31	13	1	—	—
Hemlock	385	47	50	59	63	78	81	7	—
White pine[3]	223	49	45	36	37	33	23	—	—
Total softwoods	1,596	413	365	277	224	158	152	7	—
Select white oaks	2,439	—	543	537	327	295	633	80	24
Select red oaks	3,502	—	560	646	588	503	1,072	123	10
Other white oaks	3,008	—	609	539	440	397	875	110	38
Other red oaks	3,604	—	590	625	675	558	1,089	67	—
Hickory	2,354	—	564	497	404	317	524	48	—
Yellow birch	365	—	48	53	54	44	149	14	3
Sweet birch	464	—	91	85	90	55	135	8	—
Sugar maple	1,423	—	210	204	192	177	580	53	7

CONTINUED

Table 17 — *continued*

Species	Diameter class (inches at breast height)								
	All classes	9.0- [2]10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 28.9	29.0- 38.9	39.0+
Red maple	955	—	213	192	159	114	244	33	—
Beech	1,932	—	315	376	314	271	600	56	—
Blackgum	591	—	81	92	97	108	213	—	—
Ash	462	—	114	107	93	52	96	—	—
Basswood	907	—	180	184	147	125	271	—	—
Yellow-poplar	2,796	—	609	645	622	398	495	27	—
Black cherry	693	—	220	150	130	77	116	—	—
Cucumbertree	353	—	81	81	86	47	58	—	—
Black walnut	246	—	40	50	53	35	59	9	—
Other hardwoods	1,089	—	272	257	175	118	259	8	—
Total hardwoods	27,183	—	5,340	5,320	4,646	3,691	7,468	636	82
All species	28,779	413	5,705	5,597	4,870	3,849	7,620	643	82

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[1] International ¼-inch rule.

[2] Softwoods only.

[3] Includes about 7 million board feet of other softwood species.

Table 18. — *Volume of sawtimber on commercial forest land in West Virginia, by species and quality classes, 1961*

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			Tie-and-timber logs[2]
		Grade 1	Grade 2	Grade 3	
Softwoods:					
Yellow pines	797	123	190	484	—
White pine	215	50	69	96	—
Other softwoods[3]	584	—	—	—	—
Total	1,596	173	259	580	—
Hardwoods:					
Select red and white oaks	5,941	701	1,242	2,570	1,428
Other red and white oaks	6,612	831	1,426	2,493	1,862
Hickory	2,354	174	485	1,041	654
Yellow birch	365	31	83	206	45
Sugar maple	1,423	87	227	683	426
Ash, walnut and cherry	1,401	163	356	733	149
Yellow-poplar	2,796	398	454	1,200	744
Other hardwoods	6,291	476	1,105	3,246	1,464
Total	27,183	2,861	5,378	12,172	6,772
All species	28,779	3,034	5,637	12,752	6,772

[1] International ¼-inch rule.

[2] Meet minimum specifications for hardwood tie-and-timber logs but not for standard lumber logs; not applicable to softwoods.

[3] Spruce, hemlock, and miscellaneous softwoods were not graded into standard-lumber logs.

Table 19. — *Sampling errors for major timber-volume breakdowns in West Virginia, 1961*

Table No.	Volume breakdown classification	Sampling error
		Percent
13.	Class of timber (cubic feet):	
	Softwood growing stock	7
	Hardwood growing stock	2
	Sawtimber trees	2
	Poletimber trees	2
	All growing stock	2
	Sound cull trees	7
	Rotten cull trees	4
	All live trees	1
14.	Ownership:	
	Growing stock (cubic feet)	
	National forest	2
	Other public	17
	Forest industry	15
	Farmer and misc. private	2
	Sawtimber (board feet)	
	National forest	4
	Other public	21
	Forest industry	17
	Farmer and misc. private	3
	Softwood sawtimber	9
	Hardwood sawtimber	3
	All sawtimber	2
15.	Stand size:	
	Growing stock (cubic feet)	
	Sawtimber stands	3
	Poletimber stands	4
	Sapling-and-seedling stands	3
	Nonstocked areas	4
	Sawtimber (board feet)	
	Sawtimber stands	3
	Poletimber stands	5
	Sapling-and-seedling stands	13
	Nonstocked areas	—

Table No.	Volume breakdown classification	Sampling error	
		Cubic feet	Board feet
		Percent	
16-17.	Species:		
	Shortleaf pine	6	15
	Pitch and Virginia pines	11	11
	Spruce	12	15
	Hemlock	15	16
	White pine	43	45
	Select white oaks	5	7
	Select red oaks	4	5
	Other white oaks	4	6
	Other red oaks	6	7
	Hickory	5	7
	Yellow birch	8	8
	Sweet birch	10	10
	Sugar maple	6	8
	Red maple	6	9
	Beech	7	8
	Blackgum	7	10
	Ash	7	9
	Basswood	8	9
	Yellow-poplar	6	8
	Black cherry	12	17
	Cucumbertree	9	11
	Black walnut	9	16
	Other hardwoods	6	13
16-17.	Diameter class (inches):		
	5.0- 6.9	2	*
	7.0- 8.9	2	*
	[1]9.0-10.9	2	9
	11.0-12.9	3	3
	13.0-14.9	3	3
	15.0-16.9	4	4
	17.0-18.9	4	4
	19.0-28.0	4	4
	29.0-38.9	11	11
	39.0 and larger	38	38

* No volume in this classification.

[1] Board-foot sampling error for this class is for softwoods only.

Table 20. — ***Components of net annual growth of growing stock and sawtimber on commercial forest land in West Virginia, by species group, 1960***

Components	All species	Softwoods	Hardwoods
GROWING STOCK *Thousands of cubic feet*			
Growth on initial growing stock[1]	214,239	16,187	198,052
Ingrowth — saplings that became poletimber	199,940	19,397	180,543
Gross growth	414,179	35,584	378,595
Annual mortality	43,891	8,122	35,769
Net annual growth	370,288	27,462	342,826
SAWTIMBER *Thousands of board feet*[2]			
Growth on initial sawtimber inventory[1]	577,258	70,224	507,034
Ingrowth — poletimber trees that became sawtimber	561,707	33,261	528,446
Gross growth	1,138,965	103,485	1,035,480
Annual mortality	97,669	25,979	71,690
Net annual growth	1,041,296	77,506	963,790

[1] Includes growth on trees that were cut.
[2] International ¼-inch rule.

Table 21. — *Net annual growth and annual cut of growing stock on commercial forest land in West Virginia, by species, 1960*

(In thousands of cubic feet)

Species	Net annual growth	Annual timber cut[1]
Softwoods:		
Yellow pines	15,011	2,022
White pine	3,307	3,075
Spruce	3,021	203
Hemlock	5,946	3,971
Other softwoods	177	0
Total	27,462	9,271
Hardwoods:		
Select red and white oaks	75,774	22,644
Other red and white oaks	62,015	30,520
Hickory	20,874	7,978
Yellow birch	5,550	345
Sugar maple	11,679	5,140
Sweetgum	249	1,254
Ash, black walnut, black cherry	25,667	2,524
Yellow-poplar	46,424	20,497
Other hardwoods	94,594	18,813
Total	342,826	109,715
All species	370,288	118,986

[1] Annual cut is based on trend level between 1947 and 1960 as developed from the remeasurement of permanent sample plots.

Table 22. — *Net annual growth and annual cut of growing stock on commercial forest land in West Virginia, by ownership classes and by softwoods and hardwoods, 1960*

(In thousands of cubic feet)

Ownership class	Net annual growth			Annual timber cut		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National forest	37,694	3,589	34,105	5,957	1,288	4,669
Other public	14,658	1,319	13,339	10,132	654	9,478
Forest industry	19,628	1,081	18,547	1,088	98	990
Farmer and misc. private	298,308	21,473	276,835	101,809	7,231	94,578
All ownerships	370,288	27,462	342,826	118,986	9,271	109,715

Table 23. — *Net annual growth and annual cut of sawtimber on commercial forest land in West Virginia, by species, 1960*
(In thousands of board feet)[1]

Species	Net annual growth	Annual timber cut[2]
Softwoods:		
Yellow pines	38,833	5,755
White pine	10,774	13,425
Spruce	9,032	767
Hemlock	18,509	14,650
Other softwoods	358	0
Total	77,506	34,597
Hardwoods:		
Select red and white oaks	228,530	83,247
Other red and white oaks	176,446	110,108
Hickory	54,228	28,075
Yellow birch	12,793	1,365
Sugar maple	31,148	18,902
Sweetgum	869	5,070
Ash, black walnut, black cherry	55,565	8,134
Yellow-poplar	124,742	77,284
Other hardwoods	279,469	66,546
Total	963,790	398,731
All species	1,041,296	433,328

[1] International ¼-inch rule.

[2] Annual cut is based on trend level between 1947 and 1960 as developed from the remeasurement of permanent sample plots.

Table 24.—*Net annual growth and annual cut of sawtimber on commercial forest land in West Virginia, by ownership classes and by softwoods and hardwoods, 1960*

(In thousands of board feet)[1]

Ownership class	Net annual growth			Annual cut		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National forest	101,896	14,964	86,932	22,201	4,732	17,469
Other public	41,851	5,686	36,165	32,172	2,463	29,709
Forest industry	59,082	2,939	56,143	3,432	328	3,104
Farmer and misc. private	838,467	53,917	784,550	375,523	27,074	348,449
All ownerships	1,041,296	77,506	963,790	433,328	34,597	398,731

[1] International ¼-inch rule.

Table 25. — *Annual mortality of growing stock and sawtimber on commercial forest land in West Virginia, by species, 1960*

Species	Growing stock	Sawtimber
	Thousand cubic feet	*Thousand board feet*[1]
Softwoods:		
Yellow pines	4,341	17,253
White pine	2,002	5,009
Spruce	1,176	960
Hemlock	545	2,637
Other softwoods	58	120
Total	8,122	25,979
Hardwoods:		
Select red and white oaks	6,705	12,819
Other red and white oaks	3,699	7,910
Hickory	3,179	5,006
Yellow birch	939	2,527
Sugar maple	644	1,212
Sweetgum	22	70
Ash, black walnut, black cherry	1,685	874
Yellow-poplar	2,988	10,684
Other hardwoods	15,908	30,588
Total	35,769	71,690
All species	43,891	97,669

[1] International ¼-inch rule.

Table 26.—*Annual mortality of growing stock and sawtimber on commercial forest land in West Virginia, by ownership classes and by softwoods and hardwoods, 1960*

Ownership	Growing stock Thousand cubic feet			Sawtimber Thousand board feet[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National forest	4,684	1,036	3,648	8,087	1,759	6,328
Other public	2,355	474	1,881	7,340	1,540	5,800
Forest industry	2,459	467	1,992	7,750	1,200	6,550
Farmer and misc. private	34,393	6,145	28,248	74,492	21,480	53,012
All ownerships	43,891	8,122	35,769	97,669	25,979	71,690

[1] International ¼-inch rule.

Table 27.—*Annual mortality of growing stock and sawtimber on commercial forest land in West Virginia, by causes and by softwoods and hardwoods, 1960*

Cause of death	Growing stock Thousand cubic feet			Sawtimber Thousand board feet[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Fire	5,009	1,685	3,324	15,856	5,692	10,164
Insects	424	0	424	0	0	0
Diseases	25,689	4,206	21,483	56,665	14,206	42,459
Other	9,417	1,073	8,344	20,171	1,907	18,264
Unknown	3,352	1,158	2,194	4,977	4,174	803
All causes	43,891	8,122	35,769	97,669	25,979	71,690

[1] International ¼-inch rule.

Table 28.—*Total output of timber products, by products, by type of material used, and by softwoods and hardwoods, West Virginia, 1960*

Product and species group	Total output in standard units		Output from roundwood		Output from plant byproducts, standard units
	Unit	Number	Standard units	M cubic feet	
Sawlogs:					
Softwood	M board feet[1]	12,000	12,000	2,160	0
Hardwood	M board feet[1]	322,000	322,000	56,378	0
Total	M board feet[1]	334,000	334,000	58,538	0
Veneer logs and bolts:					
Softwood	M board feet	0	0	0	0
Hardwood	M board feet	2,299	2,299	414	0
Total	M board feet	2,299	2,299	414	0
Cooperage logs and bolts:					
Softwood	M board feet	0	0	0	0
Hardwood	M board feet	1,550	1,550	279	0
Total	M board feet	1,550	1,550	279	0
Pulpwood:					
Softwood	Standard cords[2]	87,150	87,150	6,972	0
Hardwood	Standard cords[2]	158,850	158,850	12,708	0
Total	Standard cords[2]	246,000	246,000	19,680	0
Piling:					
Softwood	M linear feet	0	0	0	0
Hardwood	M linear feet	34	34	20	0
Total	M linear feet	34	34	20	0

Poles:					
Softwood	M pieces	(3)	(3)	5	0
Hardwood	M pieces	5	5	60	0
Total	M pieces	5	5	65	0
Mine timbers (round):					
Softwood	M cubic feet	250	250	250	0
Hardwood	M cubic feet	7,200	7,200	7,200	0
Total	M cubic feet	7,450	7,450	7,450	0
Misc. industrial wood:[4]					
Softwood	M cubic feet	0	0	0	0
Hardwood	M cubic feet	13,788	6,001	6,001	7,787
Total	M cubic feet	13,788	6,001	6,001	7,787
Posts (round and split):					
Softwood	M pieces	0	0	0	0
Hardwood	M pieces	867	867	432	0
Total	M pieces	867	867	432	0
Fuelwood:					
Softwood	Standard cords	750	750	60	0
Hardwood	Standard cords	362,625	192,625	15,410	170,000
Total	Standard cords	363,375	193,375	15,470	170,000
All products:					
Softwood	M cubic feet	9,447	9,447	9,447	0
Hardwood	M cubic feet	120,289	98,902	98,902	21,387
Total	M cubic feet	129,736	108,349	108,349	21,387

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[1] International ¼-inch rule.

[2] Rough wood basis (for example, chips converted to equivalent standard cords).

[3] Less than 500 pieces.

[4] Includes hewn ties, shingle bolts, turnery bolts, chemical wood, and the like.

Table 29. — *Total output of roundwood products, by source and by softwoods and hardwoods, West Virginia, 1960*

(In thousands of cubic feet)

Source	All species	Softwoods	Hardwoods
Growing-stock trees:[1]			
Sawtimber trees	86,179	7,559	78,620
Poletimber trees	15,824	1,198	14,626
Total	102,003	8,757	93,246
Cull trees[1]	2,295	11	2,284
Salvable dead trees[1]	2,972	17	2,955
Other sources[2]	1,079	662	417
All sources	108,349	9,447	98,902

[1] On commercial forest land.

[2] Includes noncommercial forest land, nonforest land such as fence rows, trees less than 5.0 inches in diameter, and tree tops and limbs.

Table 30. — *Annual timber cut from growing stock on commercial forest land in West Virginia, by products and logging residues and by softwoods and hardwoods, 1960*

(In thousands of cubic feet)

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	57,842	2,160	55,682
Veneer logs and bolts	414	0	414
Cooperage logs and bolts	279	0	279
Pulpwood	18,658	6,352	12,306
Piling	20	0	20
Poles	64	4	60
Mine timbers	7,185	213	6,972
Misc. industrial wood	5,919	0	5,919
Posts	418	0	418
Fuelwood	11,204	28	11,176
All products	102,003	8,757	93,246
Logging residues	16,983	514	16,469
Timber cut	118,986	9,271	109,715

Table 31. — *Annual timber cut from live sawtimber on commercial forest land in West Virginia, by products and logging residues, and by softwoods and hardwoods, 1960*

(In thousands of board feet)[1]

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	321,347	12,000	309,347
Veneer logs and bolts	2,299	0	2,299
Cooperage logs and bolts	1,550	0	1,550
Pulpwood	54,708	19,056	35,652
Piling	57	0	57
Poles	185	13	172
Mine timbers	20,839	639	20,200
Misc. industrial wood	7,252	0	7,252
Posts	1,212	0	1,212
Fuelwood	13,775	83	13,692
All products	423,224	31,791	391,433
Logging residues	10,104	2,806	7,298
Timber cut	433,328	34,597	398,731

[1] International ¼-inch rule.

Table 32. — *Volume of unused plant residues, by industrial source and type of residue, and by softwoods and hardwoods, West Virginia, 1960*
(In thousands of cubic feet)

Industrial source	Species and character of residues								
	All species			Softwoods			Hardwoods		
	Total	Coarse[1]	Fine[2]	Total	Coarse	Fine	Total	Coarse	Fine
Lumber industry	11,439	5,601	5,838	422	207	215	11,017	5,394	5,623
Veneer and plywood industry	14	6	8	0	0	0	14	6	8
Other primary industries	59	19	40	4	1	3	55	18	37
All industries	11,512	5,626	5,886	426	208	218	11,086	5,418	5,668

[1] Unused material suitable for chipping, such as slabs, edgings, and veneer cores.
[2] Unused material not suitable for chipping, such as sawdust and shavings.

Table 33. — *Timber growth projections for West Virginia, 1961 to 1991*[1]

Period	Assumed cut			Projected growth		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
GROWING STOCK *Thousand cubic feet*						
1961*	118,986	9,271	109,715	370,288	27,462	342,826
1971	248,486	20,271	228,215	435,322	34,374	400,948
1981	377,986	31,271	346,715	487,474	40,179	447,295
1991	507,486	42,271	465,215	509,188	42,835	466,353
SAWTIMBER *Thousand board feet*[2]						
1961*	433,328	34,597	398,731	1,041,296	77,506	963,790
1971	755,328	60,597	694,731	1,211,256	93,684	1,117,572
1981	1,077,328	86,597	990,731	1,348,860	107,253	1,241,607
1991	1,399,328	112,597	1,286,731	1,407,386	113,291	1,294,095

[1] Based upon the following assumptions, without modification: (a) that annual timber cut will approximately equal annual net growth in 30 years; (b) that timber cut will increase an equal amount each year for 30 years; and (c) that growth rates for 1960 by softwoods and hardwoods for growing stock and sawtimber will remain constant for each of the 30 years.

[2] International ¼-inch rule.

* Year of inventory.

Table 34. — *Sampling errors for major breakdowns of annual growth, cut, and mortality of growing stock and sawtimber in West Virginia, 1960*

Table No.	Breakdown classification	Sampling error
		Percent
21.	Growth in cubic feet:	
	Softwoods	30
	Hardwoods	5
	All species	5
	Cut in cubic feet:	
	Softwoods	47
	Hardwoods	18
	All species	18
22.	Growth in cubic feet:	
	National forest	7
	Other public	32
	Forest industry	37
	Farmer and misc. private	7
	Cut in cubic feet:	
	National forest	37
	Other public	47
	Forest industry	100
	Farmer and misc. private	20
23.	Growth in board feet:	
	Softwoods	46
	Hardwoods	7
	All species	7
	Cut in board feet:	
	Softwoods	55
	Hardwoods	21
	All species	20

Table No.	Breakdown classification		Sampling error
			Percent
24.	Growth in board feet:		
	National forest		10
	Other public		39
	Forest industry		45
	Farmer and misc. private		9
	Cut in board feet:		
	National forest		37
	Other public		53
	Forest industry		100
	Farmer and misc. private		23
		Cubic feet	Board feet
		Percent	
25.	Mortality by species group:		
	Softwoods	35	43
	Hardwoods	17	33
	All species	15	26
26.	Mortality by owner:		
	National forest	18	27
	Other public	50	100
	Forest industry	75	92
	Farmer and misc. private	18	31
27.	Mortality by cause:		
	Fire	60	67
	Insect	100	*
	Disease	21	38
	Other	19	31
	Unknown	39	82

* No volume fell into this classification.

Table 35. — *Land area of West Virginia, by classes of land and geographical sampling units, 1961*

(In thousands of acres)

Land class	National forest	North-eastern	Southern	North-western
Commercial forest land	869	3,373	4,063	3,084
Unproductive forest land	34	([1])	0	0
Productive-reserved forest land	1	31	8	6
Total forest land	904	3,404	4,071	3,090
Nonforest land	0	1,745	833	1,364
All land	904	5,149	4,904	4,454
Sampling errors, in percent				
Commercial forest land	0.3	1.7	1.2	1.9

[1] Less than 500 acres.

Table 36. — *Area of commercial forest land in West Virginia, by ownership classes and geographical sampling units, 1961*

(In thousands of acres)

Ownership class	National forest	North-eastern	Southern	North-western
National forest	869	—	—	—
Other Federal	—	([1])	7	7
State	—	79	33	32
County and municipal	—	([1])	3	6
Forest industry	—	275	178	77
Farmer-owned	—	1,119	578	1,124
Misc. private	—	1,900	3,264	1,838
All ownerships	869	3,373	4,063	3,084
Sampling errors, in percent				
All public ownerships[2]	—	—	—	—
Forest industry	—	18	24	35
Farmer-owned	—	8	13	8
Misc. private	—	5	3	5

[1] Less than 500 acres.

[2] Public ownership data were taken from records and therefore had no sampling errors.

Table 37. — *Area of commercial forest land in West Virginia, by stand-size classes and geographical sampling units, 1961*

(In thousands of acres)

Stand-size class	National forest	North-eastern	Southern	North-western
Sawtimber	534	1,604	2,028	1,439
Poletimber stands	312	957	1,123	713
Sapling-and-seedling stands	23	760	912	750
Nonstocked areas	0	52	0	182
All classes	869	3,373	4,063	3,084
	Sampling errors, in percent			
Sawtimber stands	4	6	4	5
Poletimber stands	6	9	8	10
Sapling-and-seedling stands	28	10	9	9
Nonstocked areas	—	80	—	30

Table 38. — *Area of commercial forest land in West Virginia, by forest types and geographical sampling units, 1961*

(In thousands of acres)

Forest type	National forest	North-eastern	Southern	North-western
White pine	16	15	43	15
Spruce	27	0	0	0
Loblolly-shortleaf pine	43	163	79	299
Oak-pine	0	44	29	42
Oak-hickory	275	2,316	2,869	1,835
Oak-gum	0	76	58	14
Elm-ash-cottonwood	0	149	163	299
Maple-beech-birch	508	595	736	499
Yellow-poplar	0	15	86	81
All types	869	3,373	4,063	3,084
	Sampling errors, in percent			
White pine	37	81	47	80
Spruce	26	—	—	—
Loblolly-shortleaf pine	21	24	37	20
Oak-pine	—	47	58	45
Oak-hickory	7	4	3	5
Oak-gum	—	36	41	49
Elm-ash-cottonwood	—	25	24	18
Maple-beech-birch	4	12	11	12
Yellow-poplar	—	81	41	57

Table 39. — *Volume of timber on commercial forest land in West Virginia, by class of timber and geographical sampling units, 1961*
(In millions of cubic feet)

Class of timber	National forest	North-eastern	Southern	North-western
Sawtimber trees:				
Sawlog portion	630	1,799	2,308	1,462
Upper-stem portion	50	125	160	99
Total	680	1,924	2,468	1,561
Poletimber trees	535	1,392	1,571	930
All growing-stock trees	1,215	3,316	4,039	2,491
Sound cull trees	90	46	68	39
Rotten cull trees	75	212	337	76
Total, all timber	1,380	3,574	4,444	2,606
Sampling errors, in percent				
Sawtimber trees	3	5	3	5
Poletimber trees	3	3	3	5
All growing-stock trees	2	3	2	4
Sound cull trees	6	16	13	30
Rotten cull trees	5	7	5	11

Table 40. — *Volume of growing stock on commercial forest land in West Virginia, by ownership, softwoods and hardwoods, and geographical sampling units, 1961*

(In millions of cubic feet)

Ownership and species group	National forest	North-eastern	Southern	North-western
National forest:				
Softwoods	136	—	—	—
Hardwoods	1,079	—	—	—
Total	1,215	—	—	—
Other public:				
Softwoods	—	8	14	10
Hardwoods	—	191	128	91
Total	—	199	142	101
Forest industry:				
Softwoods	—	2	6	14
Hardwoods	—	355	186	70
Total	—	357	192	84
Other private:				
Softwoods	—	160	123	93
Hardwoods	—	2,600	3,582	2,213
Total	—	2,760	3,705	2,306
All ownerships:				
Softwoods	136	170	143	117
Hardwoods	1,079	3,146	3,896	2,374
Total	1,215	3,316	4,039	2,491
Sampling errors, in percent				
Total line only, for:				
National forest	2	—	—	—
Other public	—	30	28	32
Forest industry	—	20	30	41
Other private	—	4	4	4
All softwoods	9	16	21	17
All hardwoods	3	4	3	4
All species	2	3	2	4

Table 41. — *Volume of sawtimber on commercial forest land in West Virginia, by ownership, softwoods and hardwoods, and geographical sampling units, 1961*

(In millions of board feet)

Ownership and species group	National forest	North-eastern	Southern	North-western
National forest:				
Softwoods	442	—	—	—
Hardwoods	2,451	—	—	—
Total	2,893	—	—	—
Other public:				
Softwoods	—	40	54	22
Hardwoods	—	455	298	205
Total	—	495	352	227
Forest industry:				
Softwoods	—	7	20	31
Hardwoods	—	864	534	164
Total	—	871	554	195
Other private:				
Softwoods	—	428	307	245
Hardwoods	—	6,571	9,528	6,113
Total	—	6,999	9,835	6,358
All ownerships:				
Softwoods	442	475	381	298
Hardwoods	2,451	7,890	10,360	6,482
Total	2,893	8,365	10,741	6,780
Sampling errors, in percent				
Total line only, for:				
National forest	3	—	—	—
Other public	—	36	32	37
Forest industry	—	22	33	47
Other private	—	6	4	6
All softwoods	10	18	22	20
All hardwoods	4	5	4	6
All species	3	5	4	5

Table 42. — *Volume of growing stock on commercial forest land in West Virginia, by stand-size classes, softwoods and hardwoods, and geographical sampling units, 1961*

(In millions of cubic feet)

Stand-size class and species group	National forest	North-eastern	Southern	North-western
Sawtimber stands:				
Softwoods	107	76	100	59
Hardwoods	821	2,113	2,666	1,714
Total	928	2,189	2,766	1,773
Poletimber stands:				
Softwoods	21	75	20	50
Hardwoods	249	871	924	551
Total	270	946	944	601
Other stands:				
Softwoods	8	19	23	8
Hardwoods	9	162	306	109
Total	17	181	329	117
All stands:				
Softwoods	136	170	143	117
Hardwoods	1,079	3,146	3,896	2,374
Total	1,215	3,316	4,039	2,491
Sampling errors, in percent				
Total line only, for:				
Sawtimber stands	4	6	4	6
Poletimber stands	3	8	7	8
Other stands	7	9	4	4
All stands	2	3	2	4

Table 43. — *Volume of sawtimber on commercial forest land in West Virginia, by stand-size classes, softwoods and hardwoods, and geographical sampling units, 1961*

(In millions of board feet)

Stand-size class and species group	National forest	North-eastern	Southern	North-western
Sawtimber stands:				
Softwoods	388	259	321	190
Hardwoods	2,213	6,713	8,724	5,273
Total	2,601	6,972	9,045	5,463
Poletimber stands:				
Softwoods	52	176	40	83
Hardwoods	236	992	1,326	712
Total	288	1,168	1,366	795
Other stands:				
Softwoods	2	40	20	25
Hardwoods	2	185	310	497
Total	4	225	330	522
All stands:				
Softwoods	442	475	381	298
Hardwoods	2,451	7,890	10,360	6,482
Total	2,893	8,365	10,741	6,780
Sampling errors, in percent				
Total line only, for:				
Sawtimber stands	4	6	5	7
Poletimber stands	7	9	10	11
Other stands	27	17	17	26
All stands	3	5	4	5

Table 44. — *Volume of growing stock on commercial forest land in West Virginia, in the National forest geographical sampling unit, by species and diameter classes, 1961*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0+
Yellow pines	30	4	7	3	4	4	3	2	3	—	—
Spruce	54	9	9	10	10	7	6	3	—	—	—
Hemlock[1]	52	7	4	4	6	6	6	6	13	—	—
Total softwoods	136	20	20	17	20	17	15	11	16	—	—
White oak	44	8	6	5	8	6	4	2	5	—	—
Northern red oak	132	12	17	18	17	15	14	11	26	2	—
Chestnut oak	109	17	16	15	14	11	10	9	16	1	—
Other red oaks	35	5	5	4	4	4	3	4	6	—	—
Hickory	40	6	6	7	7	4	3	2	5	—	—
Yellow birch	84	26	16	9	6	5	4	3	12	2	1
Sweet birch	44	14	11	7	2	3	3	2	2	—	—
Sugar maple	90	13	12	12	10	9	8	8	15	2	1
Red maple	91	23	21	18	6	4	4	6	9	—	—
Beech	126	11	13	18	21	18	18	16	11	—	—
Basswood	33	4	7	5	4	4	4	1	4	—	—
Yellow-poplar	60	2	4	9	15	12	11	3	4	—	—
Black cherry	98	8	15	21	17	13	11	7	6	—	—
Cucumbertree	24	2	3	4	4	4	3	2	2	—	—
Other hardwoods	69	12	14	14	10	7	5	3	4	—	—
Total hardwoods	1,079	163	166	166	145	119	105	79	127	7	2
All species	1,215	183	186	183	165	136	120	90	143	7	2

[1] Includes about 10 percent of other softwoods.

Note: Sampling errors are shown in tables 48 and 49.

Table 45. — *Volume of growing stock on commercial forest land in West Virginia, in the Northeastern geographical sampling unit, by species and diameter classes, 1961*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0+
Yellow pines	112	25	27	21	22	12	5	—	—	—	—
White pine	24	2	2	3	3	3	3	4	4	—	—
Hemlock[1]	34	5	5	5	4	4	4	3	2	2	—
Total softwoods	170	32	34	29	29	19	12	7	6	2	—
White oak	288	26	32	40	55	44	28	21	34	4	4
Northern red oak	377	50	47	44	42	50	43	35	56	10	—
Chestnut oak	471	80	68	71	82	54	33	26	52	5	—
Other red oaks	250	25	30	26	33	36	35	20	42	3	—
Hickory	245	34	47	37	31	27	21	14	32	2	—
Yellow birch	38	6	7	8	6	4	3	2	2	—	—
Sweet birch	76	6	11	12	17	9	5	5	9	2	—
Sugar maple	231	55	36	30	22	18	17	11	37	5	—
Red maple	197	43	43	42	22	19	12	6	10	—	—
Beech	173	16	18	24	26	23	15	12	37	2	—
Blackgum	40	2	2	4	7	6	5	4	10	—	—
Ash	65	14	13	11	11	8	4	1	3	—	—
Basswood	100	7	15	12	9	11	12	10	24	—	—
Yellow-poplar	291	30	33	48	53	39	33	26	27	2	—
Black cherry	126	15	15	19	30	15	14	8	10	—	—
Cucumbertree	23	1	1	1	4	4	6	3	3	—	—
Black walnut	26	2	2	5	5	3	2	1	5	1	—
Other hardwoods	129	23	22	15	21	18	10	7	13	—	—
Total hardwoods	3,146	435	442	449	476	388	298	212	406	36	4
All species	3,316	467	476	478	505	407	310	219	412	38	4

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[1] Includes about 30 percent of other softwoods.

Note: Sampling errors are shown in tables 48 and 49.

Table 46. — *Volume of growing stock on commercial forest land in West Virginia, in the Southern geographical sampling unit, by species and diameter classes, 1961*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0+
Yellow pines	52	6	8	5	8	9	6	5	5	—	—
Hemlock	51	11	11	4	4	5	6	8	2	—	—
White pine[1]	40	8	10	8	7	4	3	—	—	—	—
Total softwoods	143	25	29	17	19	18	15	13	7	—	—
White oak	256	42	39	37	32	31	17	15	38	5	—
Northern red oak	444	55	58	60	51	51	50	33	81	3	2
Chestnut oak	393	46	52	47	40	36	36	35	83	14	4
Other red oaks	454	32	35	39	64	58	73	55	92	6	—
Hickory	452	47	57	65	80	63	50	40	50	—	—
Yellow birch	42	3	3	3	3	4	4	5	16	1	—
Sweet birch	67	5	7	8	5	8	11	5	18	—	—
Sugar maple	179	36	29	20	15	12	10	12	45	—	—
Red maple	219	43	36	31	24	20	16	11	31	7	—
Beech	222	18	23	29	32	30	22	19	40	9	—
Blackgum	100	3	4	8	12	13	14	18	28	—	—
Ash	70	16	12	11	10	6	4	3	8	—	—
Basswood	154	12	17	20	28	23	13	14	27	—	—
Yellow-poplar	520	60	69	80	78	74	70	42	45	2	—
Cucumbertree	68	7	9	11	10	9	9	6	7	—	—
Black walnut	29	4	4	5	3	3	4	3	3	—	—
Other hardwoods	227	74	52	34	25	15	12	5	10	—	—
Total hardwoods	3,896	503	506	508	512	456	415	321	622	47	6
All species	4,039	528	535	525	531	474	430	334	629	47	6

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[1] Includes about 10 percent of other softwoods.

Note: Sampling errors are shown in tables 48 and 49.

Table 47.—*Volume of growing stock on commercial forest land in West Virginia, in the Northwestern geographical sampling unit, by species and diameter classes, 1961*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0+
Pitch and Virginia pines	63	6	11	19	16	6	5	—	—	—	—
Shortleaf pine[1]	54	10	12	9	9	5	4	3	2	—	—
Total softwoods	117	16	23	28	25	11	9	3	2	—	—
White oak	347	43	45	47	58	49	24	25	51	5	—
Northern red oak	312	35	37	42	47	41	22	25	53	10	—
Chestnut oak	188	13	19	25	36	31	21	14	24	2	3
Other red oaks	337	15	21	28	62	54	42	40	72	3	—
Hickory	270	60	47	42	40	26	15	12	21	7	—
Sugar maple	96	11	13	13	11	10	8	7	21	2	—
Red maple	61	17	14	10	7	5	4	2	2	—	—
Beech	132	10	13	12	12	21	18	11	35	—	—
Blackgum	30	3	3	3	4	5	4	1	7	—	—
Ash	79	13	11	10	8	11	10	7	9	—	—
Basswood	44	5	7	9	9	7	4	2	1	—	—
Yellow-poplar	169	19	21	22	22	27	23	12	23	—	—
Black cherry	35	3	4	5	10	6	2	1	4	—	—
Black walnut	44	7	6	6	5	6	6	4	4	—	—
Other hardwoods	230	35	35	32	31	29	19	15	33	1	—
Total hardwoods	2,374	289	296	306	362	328	222	178	360	30	3
All species	2,491	305	319	334	387	339	231	181	362	30	3

[1] Includes about 30 percent of other softwoods.

Note: Sampling errors are shown in tables 48 and 49.

Table 48. — *Sampling errors for growing stock on commercial forest land in West Virginia, by species and geographical sampling units, 1961*

(In percent)

Species	National forest	North-eastern	Southern	North-western
Pitch and Virginia pines	—	—	—	17
Yellow pines	16	20	20	—
White pine	—	25	—	—
Spruce	13	—	—	—
Hemlock	—	—	23	—
Other softwoods	14	26	65	25
White oak	11	10	9	9
Northern red oak	8	7	7	10
Chestnut oak	8	6	8	13
Other red oaks	12	12	8	12
Hickory	14	10	7	11
Yellow birch	9	21	15	—
Sweet birch	11	17	17	—
Sugar maple	10	12	8	14
Red maple	8	11	10	20
Beech	9	14	14	14
Blackgum	—	19	10	9
Ash	—	19	17	14
Basswood	16	13	13	21
Yellow-poplar	22	12	9	13
Black cherry	11	24	—	30
Cucumbertree	13	21	13	—
Black walnut	—	9	13	19
Other hardwoods	10	13	4	16

Table 49. — *Sampling errors for growing stock on commercial forest land in West Virginia, by diameter classes and geographical sampling units, 1961*

(In percent)

Diameter class (inches at breast height)	National forest	North-eastern	Southern	North-western
5.0- 6.9	3	4	3	6
7.0- 8.9	3	5	4	6
9.0-10.9	4	5	4	6
11.0-12.9	4	6	4	7
13.0-14.9	5	6	5	7
15.0-16.9	6	7	6	12
17.0-18.9	7	9	6	9
19.0-28.9	7	7	6	10
29.0-38.9	20	19	18	27
39.0 and larger	61	80	61	57

Table 50. — *Volume of sawtimber on commercial forest land in West Virginia, in the National forest geographical sampling unit, by species and diameter classes, 1961*

(In millions of board feet, International ¼-inch rule)

Species	Diameter class (inches at breast height)								
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0+
Yellow pines	89	22	17	15	13	8	14	—	—
Spruce	160	51	36	31	28	13	1	—	—
Other softwoods	193	23	23	27	25	28	67	—	—
Total softwoods	442	96	76	73	66	49	82	—	—
White oak	105	—	26	25	19	8	25	2	—
Northern red oak	374	—	60	61	66	52	126	9	—
Chestnut oak	250	—	49	44	41	38	74	2	2
Other red oaks	89	—	15	17	11	18	28	—	—
Hickory	82	—	26	16	15	8	17	—	—
Yellow birch	141	—	15	21	20	15	58	9	3
Sweet birch	50	—	7	11	15	9	8	—	—
Sugar maple	231	—	33	36	35	38	71	11	7
Red maple	122	—	21	15	16	27	41	2	—
Beech	340	—	71	71	73	71	54	—	—
Basswood	73	—	16	18	16	5	18	—	—
Yellow-poplar	193	—	53	50	50	17	21	2	—
Black cherry	221	—	62	50	52	31	26	—	—
Cucumbertree	59	—	16	15	12	7	9	—	—
Other hardwoods	121	—	46	27	21	9	18	—	—
Total hardwoods	2,451	—	516	477	462	353	594	37	12
All species	2,893	96	592	550	528	402	676	37	12

Note: Sampling errors are shown in tables 54 and 55.

Table 51. — *Volume of sawtimber on commercial forest land in West Virginia, in the Northeastern geographical sampling unit, by species and diameter classes, 1961*

(In millions of board feet, International ¼-inch rule)

Species	Diameter class (inches at breast height)								
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0+
Yellow pines	274	106	90	56	22	—	—	—	—
White pine	86	12	12	11	15	18	18	—	—
Other softwoods	115	22	21	20	17	19	9	7	—
Total softwoods	475	140	123	87	54	37	27	7	—
White oak	820	—	194	184	125	98	170	25	24
Northern red oak	1,050	—	149	203	198	179	275	46	—
Chestnut oak	1,076	—	292	223	146	126	265	24	—
Other red oaks	758	—	118	149	159	92	222	18	—
Hickory	551	—	112	113	96	65	155	10	—
Yellow birch	70	—	20	17	14	8	11	—	—
Sweet birch	195	—	59	39	23	22	44	8	—
Sugar maple	498	—	81	78	75	49	181	34	—
Red maple	284	—	78	77	54	26	49	—	—
Beech	493	—	95	94	66	54	175	9	—
Blackgum	136	—	25	23	20	17	51	—	—
Ash	108	—	39	31	20	6	12	—	—
Basswood	298	—	33	46	57	45	117	—	—
Yellow-poplar	786	—	193	166	150	126	138	13	—
Black cherry	324	—	108	65	61	35	55	—	—
Cucumbertree	86	—	15	19	26	12	14	—	—
Black walnut	69	—	14	11	7	5	23	9	—
Other hardwoods	288	—	77	75	44	33	59	—	—
Total hardwoods	7,890	—	1,702	1,613	1,341	998	2,016	196	24
All species	8,365	140	1,825	1,700	1,395	1,035	2,043	203	24

Note: Sampling errors are shown in tables 54 and 55.

Table 52. — *Volume of sawtimber on commercial forest land in West Virginia, in the Southern geographical sampling unit, by species and diameter classes, 1961*

(In millions of board feet, International ¼-inch rule)

Species	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0+
Yellow pines	171	29	32	38	28	20	24	—	—
Hemlock	123	12	16	23	26	36	10	—	—
Other softwoods	87	32	27	15	13	—	—	—	—
Total softwoods	381	73	75	76	67	56	34	—	—
White oak	590	—	112	122	74	71	185	26	—
Northern red oak	1,204	—	182	214	225	154	404	15	10
Chestnut oak	1,113	—	140	145	155	164	414	72	23
Other red oaks	1,544	—	230	242	322	261	458	31	—
Hickory	1,200	—	284	257	226	187	246	—	—
Yellow birch	148	—	11	13	18	21	80	5	—
Sweet birch	205	—	20	32	50	22	81	—	—
Sugar maple	431	—	54	49	46	56	226	—	—
Red maple	464	—	87	81	72	51	142	31	—
Beech	659	—	106	122	92	92	200	47	—
Blackgum	366	—	40	51	61	83	131	—	—
Ash	122	—	34	24	15	12	37	—	—
Basswood	441	—	99	92	56	66	128	—	—
Yellow-poplar	1,358	—	284	313	322	201	226	12	—
Cucumbertree	179	—	35	39	42	28	35	—	—
Black walnut	71	—	10	14	18	12	17	—	—
Other hardwoods	265	—	87	59	49	21	49	—	—
Total hardwoods	10,360	—	1,815	1,869	1,843	1,502	3,059	239	33
All species	10,741	73	1,890	1,945	1,910	1,558	3,093	239	33

Note: Sampling errors are shown in tables 54 and 55.

Table 53. — *Volume of sawtimber on commercial forest land in West Virginia, in the Northwestern geographical sampling unit, by species and diameter classes, 1961*

(In millions of board feet, International ¼-inch rule)

Species	Diameter class (inches at breast height)								
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0+
Pitch and Virginia pines	180	71	62	24	23	—	—	—	—
Other softwoods	118	33	29	17	14	16	9	—	—
Total softwoods	298	104	91	41	37	16	9	—	—
White oak	924	—	211	206	109	118	253	27	—
Northern red oak	874	—	169	168	99	118	267	53	—
Chestnut oak	569	—	128	127	98	69	122	12	13
Other red oaks	1,213	—	227	217	183	187	381	18	—
Hickory	521	—	142	111	67	57	106	38	—
Sugar maple	263	—	42	41	36	34	102	8	—
Red maple	85	—	27	19	17	10	12	—	—
Beech	440	—	43	89	83	54	171	—	—
Blackgum	83	—	14	17	14	7	31	—	—
Ash	196	—	30	45	48	30	43	—	—
Basswood	95	—	32	28	18	9	8	—	—
Yellow-poplar	459	—	79	116	100	54	110	—	—
Black cherry	93	—	36	22	10	6	19	—	—
Black walnut	106	—	16	25	28	18	19	—	—
Other hardwoods	561	—	111	130	90	67	155	8	—
Total hardwoods	6,482	—	1,307	1,361	1,000	838	1,799	164	13
All species	6,780	104	1,398	1,402	1,037	854	1,808	164	13

Note: Sampling errors are shown in tables 54 and 55.

Table 54. — *Sampling errors for sawtimber on commercial forest land in West Virginia, by species and geographical sampling units, 1961*

(In percent)

Species	National forest	North-eastern	Southern	North-western
Pitch and Virginia pines	—	—	—	14
Yellow pines	19	21	12	—
White pine	—	13	—	—
Spruce	16	—	—	—
Hemlock	—	—	28	—
Other softwoods	16	29	68	20
White oak	12	13	11	12
Northern red oak	11	9	9	12
Chestnut oak	10	9	11	15
Other red oaks	16	15	9	14
Hickory	15	15	10	14
Yellow birch	13	40	4	—
Sweet birch	17	21	11	—
Sugar maple	14	16	12	18
Red maple	12	21	10	32
Beech	11	17	16	18
Blackgum	—	23	11	27
Ash	—	18	11	17
Basswood	17	15	14	26
Yellow-poplar	26	13	12	16
Black cherry	14	34	—	34
Cucumbertree	16	23	18	—
Black walnut	—	13	43	16
Other hardwoods	22	12	10	28

Table 55. — *Sampling errors for sawtimber on commercial forest land in West Virginia, by diameter classes and geographical sampling units, 1961*

(In percent)

Diameter class (inches at breast height)	National forest	North-eastern	Southern	North-western
9.0-10.9[1]	12	21	16	12
11.0-12.9	4	6	4	7
13.0-14.9	5	6	5	7
15.0-16.9	6	7	6	11
17.0-18.9	7	9	6	9
19.0-28.9	6	7	6	10
29.0-38.9	20	19	18	27
39.0 and larger	60	81	61	57

[1] Softwoods only.

Table 56. — *Volume of sawtimber on commercial forest land in West Virginia, in the National forest geographical sampling unit, by species and quality classes, 1961*

(In millions of board feet)

Species	All classes	Standard-lumber logs Grade 1	Standard-lumber logs Grade 2	Standard-lumber logs Grade 3	Tie-and-timber logs
Softwoods:[1]					
Yellow pines	89	14	22	53	—
White pine	31	9	9	13	—
Other softwoods	322	—	—	—	—
Total	442	23	31	66	—
Hardwoods:[2]					
Select red and white oaks	479	69	135	228	47
Other red and white oaks	339	43	73	124	99
Hickory	82	6	17	36	23
Yellow birch	141	8	29	93	11
Sugar maple	231	16	31	148	36
Ash and black cherry	257	32	89	120	16
Yellow-poplar	193	63	34	77	19
Other hardwoods	729	60	130	356	183
Total	2,451	297	538	1,182	434
All species	2,893	320	569	1,248	434

[1] The 120 million board feet of pine includes 52 million board feet in trees less than 13.0 inches d.b.h. that cannot possibly contain a grade 1 standard-lumber log because of size specifications. Spruce, hemlock, and miscellaneous softwoods were not graded into standard-lumber logs.

[2] The 2,451 million board feet of hardwoods includes 993 million board feet in trees less than 15.0 inches d.b.h. that cannot possibly contain a grade 1 standard-lumber log because of size specifications.

Table 57. — *Volume of sawtimber on commercial forest land in West Virginia, in the Northeastern geographical sampling unit, by species and quality classes, 1961*

(In millions of board feet)

Species	All classes	Standard-lumber logs Grade 1	Standard-lumber logs Grade 2	Standard-lumber logs Grade 3	Tie-and-timber logs
Softwoods:[1]					
Yellow pines	274	25	64	185	—
White pine	86	18	29	39	—
Other softwoods	115	—	—	—	—
Total	475	43	93	224	—
Hardwoods:[2]					
Select red and white oaks	1,870	216	316	879	459
Other red and white oaks	1,834	192	330	862	450
Hickory	551	39	91	254	167
Yellow birch	70	4	15	46	5
Sugar maple	498	30	74	249	145
Ash, walnut and cherry	501	53	123	284	41
Yellow-poplar	786	113	118	337	218
Other hardwoods	1,780	92	253	1,116	319
Total	7,890	739	1,320	4,027	1,804
All species	8,365	782	1,413	4,251	1,804

[1] The 360 million board feet of pine includes 220 million board feet in trees less than 13.0 inches d.b.h. that cannot possibly contain a grade 1 standard-lumber log because of size specifications. Spruce, hemlock, and miscellaneous softwoods were not graded into standard-lumber logs.

[2] The 7,890 million board feet of hardwoods includes 3,315 million board feet in trees less than 15.0 inches d.b.h. that cannot possibly contain a grade 1 standard-lumber log because of size specifications.

Table 58. — *Volume of sawtimber on commercial forest land in West Virginia, in the Southern geographical sampling unit, by species and quality classes, 1961*

(In millions of board feet)

Species	All classes	Standard-lumber logs Grade 1	Standard-lumber logs Grade 2	Standard-lumber logs Grade 3	Tie-and-timber logs
Softwoods:[1]					
Yellow pines	171	49	45	77	—
White pine	77	17	25	35	—
Other softwoods	133	—	—	—	—
Total	381	66	70	112	—
Hardwoods:[2]					
Select red and white oaks	1,794	198	363	790	443
Other red and white oaks	2,657	365	652	938	702
Hickory	1,200	83	264	549	304
Yellow birch	148	18	38	64	28
Sugar maple	431	18	88	166	159
Ash, walnut, and cherry	248	38	47	131	32
Yellow-poplar	1,358	175	218	581	384
Other hardwoods	2,524	230	529	1,190	575
Total	10,360	1,125	2,199	4,409	2,627
All species	10,741	1,191	2,269	4,521	2,627

[1] The 248 million board feet of pine includes 110 million board feet in trees less than 13.0 inches d.b.h. that cannot possibly contain a grade 1 standard-lumber log because of size specifications. Spruce, hemlock, and miscellaneous softwoods were not graded into standard-lumber logs.

[2] The 10,360 million board feet of hardwoods includes 3,684 million board feet in trees less than 15.0 inches d.b.h. that cannot possibly contain a grade 1 standard-lumber log because of size specifications.

Table 59. — ***Volume of sawtimber on commercial forest land in West Virginia, in the Northwestern geographical sampling unit, by species and quality classes, 1961***

(In millions of board feet)

Species	All classes	Standard-lumber logs Grade 1	Grade 2	Grade 3	Tie-and-timber logs
Softwoods:[1]					
Yellow pines	263	35	59	169	—
White pine	21	6	6	9	—
Other softwoods	14	—	—	—	—
Total	298	41	65	178	—
Hardwoods:[2]					
Select red and white oaks	1,798	218	428	673	479
Other red and white oaks	1,782	231	371	569	611
Hickory	521	46	113	202	160
Sugar maple	263	23	34	120	86
Ash, walnut, and cherry	395	40	97	198	60
Yellow-poplar	459	47	84	205	123
Other hardwoods	1,264	95	194	587	388
Total	6,482	700	1,321	2,554	1,907
All species	6,780	741	1,386	2,732	1,907

[1] The 284 million board feet of pine includes 184 million board feet in trees less than 13.0 inches d.b.h. that cannot possibly contain a grade 1 standard-lumber log because of size specifications. Spruce, hemlock, and miscellaneous softwoods were not graded into standard-lumber logs.

[2] The 6,482 million board feet of hardwoods includes 2,668 million board feet in trees less than 15.0 inches d.b.h. that cannot possibly contain a grade 1 standard-lumber log because of size specifications.

Table 60. — *Components of net annual growth of growing stock and sawtimber on commercial forest land in West Virginia, by geographical sampling units, 1960*

Components	National forest	North-eastern	Southern	North-western
GROWING STOCK *Thousands of cubic feet*				
Growth on initial growing stock[1]	22,061	62,417	78,363	51,398
Ingrowth — saplings that became poletimber	20,317	74,480	66,698	38,445
Gross growth	42,378	136,897	145,061	89,843
Annual mortality	4,684	13,529	17,910	7,768
Net annual growth	37,694	123,368	127,151	82,075
SAWTIMBER *Thousands of board feet*				
Growth on initial sawtimber inventory[1]	50,451	170,721	218,116	137,970
Ingrowth — poletimber trees that became sawtimber	59,532	211,171	179,810	111,194
Gross growth	109,983	381,892	397,926	249,164
Annual mortality	8,087	29,065	50,031	10,486
Net annual growth	101,896	352,827	347,895	238,678

[1] Includes growth on trees that were cut.

Table 61. — *Net annual growth of growing stock on commercial forest land in West Virginia by geographical sampling units and species, 1960*

(In thousands of cubic feet)

Species	National forest	North-eastern	Southern	North-western
Softwoods:				
Yellow pines	422	6,679	1,416	6,494
White pine	187	1,601	1,089	430
Hemlock	1,074	1,832	2,527	513
Spruce and other softwoods	1,906	848	444	—
All softwoods	3,589	10,960	5,476	7,437
Hardwoods:				
Select oaks	5,641	27,226	21,495	21,412
Other oaks	2,966	16,392	29,504	13,153
Hickory	844	5,187	8,762	6,081
Sugar maple	1,715	4,723	3,341	1,900
Ash, walnut, and cherry	4,360	11,556	3,758	5,993
Yellow-poplar	2,501	14,772	21,462	7,689
Other hardwoods	16,078	32,552	33,353	18,410
All hardwoods	34,105	112,408	121,675	74,638
All species	37,694	123,368	127,151	82,075
Sampling errors, in percent				
All softwoods	28.0	37.0	58.0	47.0
All hardwoods	7.3	9.8	9.6	9.6
All species	7.2	8.6	9.8	10.7

Table 62. — *Net annual growth of sawtimber on commercial forest land in West Virginia, by geographical sampling units and species, 1960*

(In thousands of board feet, International ¼-inch rule)

Species	National forest	North-eastern	Southern	North-western
Softwoods:				
Yellow pines	1,894	15,254	3,487	18,198
White pine	646	6,932	1,472	1,724
Hemlock	5,498	6,949	4,995	1,067
Spruce and other softwoods	6,926	2,216	248	—
All softwoods	14,964	31,351	10,202	20,989
Hardwoods:				
Select oaks	18,802	70,615	74,963	64,150
Other oaks	6,838	42,457	86,178	40,973
Hickory	1,477	10,124	30,622	12,005
Sugar maple	4,953	11,286	8,653	6,256
Ash, walnut, and cherry	10,332	20,679	9,424	15,130
Yellow-poplar	9,176	41,796	53,435	20,335
Other hardwoods	35,354	124,519	74,418	58,840
All hardwoods	86,932	321,476	337,693	217,689
All species	101,896	352,827	347,895	238,678
Sampling errors, in percent				
All softwoods	29.0	48.0	125.0	98.0
All hardwoods	11.0	14.3	11.3	14.9
All species	10.1	12.8	11.7	16.3

Table 63. — *Annual cut of growing stock and sawtimber on commercial forest land in West Virginia, by geographical sampling units and species, 1960*

Species	National forest	North-eastern	Southern	North-western
	GROWING STOCK			
	Thousand cubic feet			
Pines	308	476	2,022	2,291
Other softwoods	980	962	1,838	394
Total softwoods	1,288	1,438	3,860	2,685
Oaks	1,180	18,378	25,910	7,696
Hickory	84	1,515	3,501	2,878
Sugar maple	275	1,531	1,637	1,697
Ash, walnut, and cherry	197	847	399	1,081
Yellow-poplar	250	5,699	13,329	1,219
Other hardwoods	2,683	8,067	7,690	1,972
Total hardwoods	4,669	36,037	52,466	16,543
All species	5,957	37,475	56,326	19,228
Sampling error, percent	36.0	30.0	30.0	25.0
	SAWTIMBER			
	Thousand board feet			
	International ¼-inch rule			
Pines	1,112	1,790	7,460	8,818
Other softwoods	3,620	3,554	6,788	1,455
Total softwoods	4,732	5,344	14,248	10,273
Oaks	4,168	68,360	94,876	25,951
Hickory	265	5,371	13,341	9,098
Sugar maple	1,001	5,719	6,126	6,056
Ash, walnut, and cherry	655	2,710	1,266	3,503
Yellow-poplar	943	20,183	52,054	4,104
Other hardwoods	10,437	25,581	29,983	6,980
Total hardwoods	17,469	127,924	197,646	55,692
All species	22,201	133,268	211,894	65,965
Sampling error, percent	37.0	32.0	34.0	38.0

Table 64. — *County area in the National forest geographical sampling unit, by class, 1961*

County[1]	Total land area[2]	Nonforest land area	Forest land area		
			Non-commercial	Commercial	
				Acreage	Error[3]
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Percent*
Grant	14.1	0	4.3	9.8	10
Greenbrier	98.9	0	2.9	96.0	1
Hampshire	2.7	0	0	2.7	50
Hardy	48.3	0	0	48.3	18
Nicholas	23.5	0	0	23.5	21
Pendleton	107.4	0	7.9	99.5	2
Pocahontas	277.0	0	2.5	274.5	1
Preston	3.9	0	0	3.9	39
Randolph	170.4	0	9.6	160.8	1
Tucker	93.0	0	6.8	86.2	2
Webster	64.7	0	.9	63.8	1
Total	903.9	0	34.9	869.0	0.3

[1] Acreages for partial counties only; for acreages for the entire county, see table 65.

[2] From U. S. Bureau of the Census, Land and Water Area of the United States, 1960.

[3] Sampling error at the 68-percent probability level.

Table 65. — *County area of counties within both the National forest and the Northeastern or Southern sampling units, by class, 1961*

County	Total land area	Nonforest land area	Forest land area		
			Non-commercial	Commercial	
				Acreage	Error
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Percent*
Grant	305.3	82.6	4.3	218.4	4
Greenbrier	656.6	143.2	2.9	510.5	3
Hampshire	409.0	124.1	0	284.9	4
Hardy	374.4	85.6	3.6	285.2	6
Nicholas	415.4	69.1	.2	346.1	3
Pendleton	444.8	97.3	7.9	339.6	2
Pocahontas	603.5	123.8	12.7	467.0	2
Preston	412.8	147.0	.1	265.7	3
Randolph	663.1	101.5	9.6	552.0	2
Tucker	269.4	33.3	8.5	227.6	5
Webster	352.6	38.1	8.4	306.1	3
Total	4,906.9	1,045.6	58.2	3,803.1	1

Table 66. — *County area in the Northeastern geographical sampling unit, by class, 1961*

County	Total land area	Nonforest land area	Forest land area		
			Non-commercial	Commercial	
				Acreage	Error
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Percent*
Barbour	215.0	82.7	0.9	131.4	6
Berkeley	202.3	105.2	0	97.1	8
Braxton	330.9	117.3	0	213.6	5
Grant*	291.2	82.6	0	208.6	4
Hampshire*	406.3	124.1	0	282.2	4
Hardy*	326.1	85.6	3.6	236.9	4
Harrison	267.5	153.7	.4	113.4	8
Jefferson	135.0	102.5	0	32.5	18
Lewis	250.9	116.6	0	134.3	7
Mineral	211.2	53.3	0	157.9	4
Morgan	149.1	33.8	5.8	109.5	5
Pendleton*	337.4	97.3	0	240.1	2
Pocahontas*	326.5	123.8	10.2	192.5	3
Preston*	408.9	147.0	.1	261.8	3
Randolph*	492.7	101.5	0	391.2	2
Taylor	108.8	52.9	1.2	54.7	9
Tucker*	176.4	33.3	1.7	141.4	7
Upshur	225.3	93.9	.2	131.2	6
Webster*	287.9	38.1	7.5	242.3	3
Total	5,149.4	1,745.2	31.6	3,372.6	1.7

* Acreages are shown only for the land that is not National forest; for acreages for the entire county, see table 65.

Table 67. — *County area in the Southern geographical sampling unit, by class, 1961*

County	Total land area	Nonforest land area	Forest land area		
			Non-commercial	Commercial	
				Acreage	Error
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Percent*
Boone	320.6	24.7	0.0	295.9	2
Clay	218.9	33.7	0	185.2	3
Fayette	421.8	63.0	3.3	355.5	2
Greenbrier*	557.7	143.2	0	414.5	3
Kanawha	581.1	95.4	.1	485.6	2
Logan	291.8	21.2	3.3	267.3	2
McDowell	341.1	32.7	0	308.4	2
Mercer	266.9	74.4	0	192.5	4
Mingo	270.7	20.0	0	250.7	2
Monroe	302.7	93.8	0	208.9	5
Nicholas*	391.9	69.1	.2	322.6	3
Raleigh	386.6	77.7	1.3	307.6	3
Summers	229.8	56.4	.2	173.2	4
Wyoming	322.6	27.7	0	294.9	2
Total	4,904.2	833.0	8.4	4,062.8	1.2

* Acreages are shown only for the land that is not National forest; for acreages for the entire county, see table 65.

Table 68. — *County area in the Northwestern geographical sampling unit, by class, 1961*

County	Total land area	Nonforest land area	Forest land area		
			Non-commercial	Commercial	
				Acreage	Error
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*Per-cent*
Brooke	57.0	30.8	0	26.2	14
Cabell	178.6	47.9	0	130.7	5
Calhoun	179.8	33.2	0	146.6	4
Doddridge	204.2	61.7	0	142.5	5
Gilmer	216.9	39.9	2.0	175.0	4
Hancock	52.5	18.8	1.3	32.4	10
Jackson	296.3	108.6	0	187.7	5
Lincoln	280.3	54.8	0	225.5	3
Marion	197.8	69.9	.1	127.8	6
Marshall	195.8	77.8	0	118.0	6
Mason	276.5	108.2	0	168.3	5
Monongalia	233.6	99.2	0	134.4	6
Ohio	68.5	33.2	.8	34.5	12
Pleasants	83.2	23.9	0	59.3	7
Putnam	223.3	42.0	0	181.3	3
Ritchie	289.3	92.1	1.4	195.8	4
Roane	311.0	113.2	0	197.8	5
Tyler	163.8	60.3	0	103.5	6
Wayne	328.3	69.3	.1	258.9	3
Wetzel	231.7	47.6	0	184.1	3
Wirt	149.8	42.0	0	107.8	5
Wood	235.5	89.6	0	145.9	6
Total	4,453.7	1,364.0	5.7	3,084.0	1.9

Table 69. — *Commercial forest land in the National forest geographical sampling unit, by county and ownership group and by stand-size class, 1961*

(In thousands of acres)

County[1]	Ownership		Stand-size class		
	Public	Private	Sawtimber stands	Poletimber stands	Other stands
Grant	9.8	0	6.5	3.1	0.2
Greenbrier	96.0	0	64.7	29.5	1.8
Hampshire	2.7	0	1.8	.8	.1
Hardy	48.3	0	31.5	15.7	1.1
Nicholas	23.5	0	14.7	8.2	.6
Pendleton	99.5	0	65.1	31.9	2.5
Pocahontas	274.5	0	162.3	104.0	8.2
Preston	3.9	0	2.5	1.3	.1
Randolph	160.8	0	94.2	62.8	3.8
Tucker	86.2	0	51.6	31.0	3.6
Webster	63.8	0	39.1	23.7	1.0
Total	869.0	0	534.0	312.0	23.0

[1] Acreages for partial counties only; for acreage for the entire county, see table 70.

Table 70. — *Commercial forest land of counties within both the National forest and the Northeastern or Southern sampling units, by ownership group and by stand-size class, 1961*

(In thousands of acres)

County	Ownership		Stand-size class		
	Public	Private	Sawtimber stands	Poletimber stands	Other stands
Grant	9.8	208.6	101.3	65.6	51.5
Greenbrier	101.0	409.3	272.8	138.5	99.0
Hampshire	9.9	275.0	142.9	80.4	61.6
Hardy	56.2	229.0	149.3	86.0	49.9
Nicholas	23.5	322.4	173.9	98.7	73.3
Pendleton	99.5	240.1	188.8	104.2	46.6
Pocahontas	296.9	170.3	247.8	161.5	57.9
Preston	8.9	256.8	123.5	77.4	64.8
Randolph	170.3	381.7	301.4	170.4	80.2
Tucker	86.2	141.4	114.1	71.8	41.7
Webster	63.8	242.4	137.2	97.5	71.5
Total	926.0	2,877.0	1,953.0	1,152.0	698.0

Table 71. — *Commercial forest land in the Northeastern geographical sampling unit, by county and ownership group and by stand-size class, 1961*

(In thousands of acres)

County	Ownership		Stand-size class		
	Public	Private	Sawtimber stands	Poletimber stands	Other stands
Barbour	0	131.4	50.9	37.9	42.6
Berkeley	13.0	84.1	46.0	29.3	21.8
Braxton	6.2	207.4	101.8	56.1	55.7
Grant*	0	208.6	94.8	62.5	51.3
Hampshire*	7.2	275.1	141.2	79.6	61.5
Hardy*	7.9	229.0	117.8	70.3	48.8
Harrison	0	113.4	54.9	29.3	29.2
Jefferson	0	32.5	18.1	7.0	7.4
Lewis	.5	133.8	54.5	37.2	42.6
Mineral	.1	157.8	85.8	39.9	32.2
Morgan	7.2	102.3	50.8	30.9	27.8
Pendleton*	0	240.1	123.7	72.3	44.1
Pocahontas*	22.2	170.3	85.5	57.5	49.5
Preston*	5.0	256.9	121.0	76.2	64.7
Randolph*	9.4	381.9	207.3	107.6	76.4
Taylor	.3	54.4	23.8	14.6	16.3
Tucker*	0	141.4	62.5	40.8	38.1
Upshur	0	131.2	65.5	34.2	31.5
Webster*	0	242.4	98.1	73.8	70.5
Total	79.0	3,294.0	1,604.0	957.0	812.0

* Acreages are shown only for the land that is not National forest; for acreages for the entire county, see table 70.

Table 72. — *Commercial forest land in the Southern geographical sampling unit, by county and ownership group and by stand-size class, 1961*

(In thousands of acres)

County	Ownership		Stand-size class		
	Public	Private	Sawtimber stands	Poletimber stands	Other stands
Boone	7.9	288.0	176.3	74.0	45.6
Clay	0	185.2	71.7	56.5	57.0
Fayette	.8	354.7	190.9	89.3	75.3
Greenbrier*	5.0	409.5	208.2	109.1	97.2
Kanawha	6.8	478.8	225.5	139.4	120.7
Logan	.0	267.3	156.6	66.9	43.8
McDowell	7.7	300.9	151.3	91.6	65.7
Mercer	5.8	186.7	74.6	60.5	57.4
Mingo	.0	250.7	137.2	67.2	46.3
Monroe	.0	208.9	83.6	64.1	61.2
Nicholas*	.0	322.6	159.3	90.6	72.7
Raleigh	1.5	306.1	168.1	82.7	56.8
Summers	7.5	165.7	77.5	51.3	44.4
Wyoming	.0	294.9	147.2	79.8	67.9
Total	43.0	4,020.0	2,028.0	1,123.0	912.0

* Acreages are shown only for the land that is not National forest; for acreages for the entire county, see table 70.

Table 73. — *Commercial forest land in the Northwestern geographical sampling unit, by county and ownership group and by stand-size class, 1961*

(In thousands of acres)

County	Ownership		Stand-size class		
	Public	Private	Sawtimber stands	Poletimber stands	Other stands
Brooke	0.0	26.2	12.3	5.6	8.3
Cabell	.1	130.6	62.0	32.2	36.5
Calhoun	0	146.6	68.5	34.1	44.0
Doddridge	0	142.5	69.9	30.4	42.2
Gilmer	0	175.0	75.8	41.2	58.0
Hancock	0	32.4	17.8	7.1	7.5
Jackson	0	187.7	76.7	48.5	62.5
Lincoln	5.7	219.8	98.4	53.4	73.7
Marion	0	127.8	64.5	27.4	35.9
Marshall	0	118.0	65.7	25.0	27.3
Mason	17.7	150.6	80.4	39.8	48.1
Monongalia	8.6	125.8	59.6	30.1	44.7
Ohio	0	34.5	18.2	7.1	9.2
Pleasants	0	59.3	29.6	13.7	16.0
Putnam	0	181.3	76.9	44.2	60.2
Ritchie	0	195.8	96.6	45.0	54.2
Roane	0	197.8	83.4	45.5	68.9
Tyler	0	103.5	45.1	25.2	33.2
Wayne	8.1	250.8	104.0	62.6	92.3
Wetzel	4.7	179.4	113.4	37.8	32.9
Wirt	.1	107.7	54.3	23.5	30.0
Wood	0	145.9	65.9	33.6	46.4
Total	45.0	3.039.0	1,439.0	713.0	932.0

Table 74. — *Commercial forest land in the National forest geographical sampling unit, by county and forest-type group, 1961*

(In thousands of acres)

County[1]	White pine, spruce	Loblolly-shortleaf pine	Oak types[2]	Maple-beech-birch	Other hardwood types[3]
Grant	0.4	0.4	3.3	5.7	0
Greenbrier	3.2	3.7	33.5	55.6	0
Hampshire	.1	.1	1.0	1.5	0
Hardy	1.8	2.1	16.2	28.2	0
Nicholas	1.1	1.2	7.6	13.6	0
Pendleton	4.1	3.8	33.7	57.9	0
Pocahontas	15.9	15.2	83.8	159.6	0
Preston	.1	.2	1.3	2.3	0
Randolph	8.4	9.0	47.7	95.7	0
Tucker	5.3	3.9	27.2	49.8	0
Webster	2.6	3.4	19.7	38.1	0
Total	43.0	43.0	275.0	508.0	0

[1] Acreages for partial counties only; for acreages for the entire county, see table 75.
[2] Includes the oak-pine, oak-hickory, and oak-gum forest types.
[3] Includes the elm-ash-cottonwood and yellow-poplar forest types.

Table 75. — *Commercial forest land of counties within both the National forest and the Northeastern or Southern sampling units, by forest-type group, 1961*

(In thousands of acres)

County	White pine, spruce	Loblolly-shortleaf pine	Oak types	Maple-beech-birch	Other hardwood types
Grant	1.2	11.3	154.5	41.1	10.3
Greenbrier	8.3	13.4	331.6	130.5	26.5
Hampshire	1.3	13.7	206.3	49.9	13.7
Hardy	3.2	13.1	189.5	67.5	11.9
Nicholas	4.2	7.6	242.7	72.5	18.9
Pendleton	6.0	13.5	210.5	97.8	11.8
Pocahontas	16.6	25.4	223.1	192.7	9.4
Preston	1.4	13.1	190.1	47.8	13.3
Randolph	10.5	24.9	333.8	165.1	17.7
Tucker	5.9	11.1	128.0	75.2	7.4
Webster	3.4	16.9	192.9	80.9	12.1
Total	62.0	164.0	2,403.0	1,021.0	153.0

Table 76. — *Commercial forest land in the Northeastern geographical sampling unit, by county and forest-type group, 1961*

(In thousands of acres)

County	White pine, spruce	Loblolly-shortleaf pine	Oak types	Maple-beech-birch	Other hardwood types
Barbour	0.4	7.5	92.4	24.6	6.5
Berkeley	.5	4.5	71.5	16.5	4.1
Braxton	.7	10.5	152.2	39.7	10.5
Grant*	.8	10.9	151.2	35.4	10.3
Hampshire*	1.2	13.6	205.4	48.4	13.7
Hardy*	1.4	11.0	173.3	39.3	11.9
Harrison	.4	5.3	81.4	21.2	5.1
Jefferson	.1	1.4	23.6	6.1	1.3
Lewis	.4	7.7	94.2	24.9	7.1
Mineral	.6	6.6	114.4	29.1	7.2
Morgan	.5	5.3	78.6	19.8	5.3
Pendleton*	1.9	9.7	176.8	39.9	11.8
Pocahontas*	.7	10.2	139.3	32.9	9.4
Preston*	1.3	12.9	188.9	45.5	13.3
Randolph*	2.1	16.0	286.1	69.4	17.7
Taylor	.1	3.1	38.7	10.1	2.7
Tucker*	.6	7.2	100.8	25.4	7.4
Upshur	.5	6.1	94.0	24.0	6.6
Webster*	.8	13.5	173.2	42.8	12.1
Total	15.0	163.0	2,436.0	595.0	164.0

*Acreages shown are only for the land that is not National forest; for acreages for the entire county, see table 75.

Table 77. — *Commercial forest land in the Southern geographical sampling unit, by county and forest-type group, 1961*

(In thousands of acres)

County	White pine	Loblolly-shortleaf pine	Oak types	Maple-beech-birch	Other hardwood types
Boone	2.3	3.5	218.5	55.5	16.1
Clay	2.8	4.8	133.6	31.0	13.0
Fayette	4.4	6.6	255.3	65.5	23.7
Greenbrier*	5.0	9.7	298.3	74.9	26.6
Kanawha	5.7	10.1	351.3	87.2	31.3
Logan	2.3	3.1	192.7	52.7	16.5
McDowell	2.3	4.9	228.0	56.9	16.5
Mercer	2.2	5.6	140.4	32.6	11.7
Mingo	2.3	3.4	184.5	46.0	14.5
Monroe	2.3	6.4	152.0	36.0	12.2
Nicholas*	3.1	6.4	235.3	58.9	18.9
Raleigh	2.5	5.1	225.3	57.2	17.5
Summers	1.8	4.3	127.2	29.9	10.0
Wyoming	4.0	5.1	213.6	51.7	20.5
Total	43.0	79.0	2,956.0	736.0	249.0

* Acreages are shown only for the land that is not National forest; for acreages of the entire county, see table 75.

Table 78. — *Commercial forest land in the Northwestern geographical sampling unit, by county and forest-type group, 1961*

(In thousands of acres)

County	White pine	Loblolly-shortleaf pine	Oak types	Maple-beech-birch	Other hardwood types
Brooke	0.1	3.2	15.3	4.3	3.3
Cabell	.7	12.1	82.1	19.6	16.2
Calhoun	.5	13.0	91.2	22.9	19.0
Doddridge	.6	13.4	86.7	24.7	17.1
Gilmer	.7	16.5	107.8	27.6	22.4
Hancock	.2	3.0	20.1	5.3	3.8
Jackson	.8	20.5	116.1	25.1	25.2
Lincoln	.9	21.2	140.5	33.9	29.0
Marion	.6	12.3	79.4	20.5	15.0
Marshall	.8	10.8	71.0	22.2	13.2
Mason	1.0	17.4	103.8	26.2	19.9
Monongalia	.5	15.0	81.5	20.2	17.2
Ohio	.2	3.5	18.6	7.8	4.4
Pleasants	.4	5.4	36.6	10.2	6.7
Putnam	.9	17.4	112.8	27.7	22.5
Ritchie	1.1	18.4	119.6	33.3	23.4
Roane	.9	21.7	122.2	29.3	23.7
Tyler	.4	11.0	63.3	15.4	13.4
Wayne	1.1	26.0	160.4	38.4	33.0
Wetzel	1.3	12.1	107.7	42.0	21.0
Wirt	.7	9.7	65.2	19.8	12.4
Wood	.6	15.4	89.1	22.6	18.2
Total	15.0	299.0	1,891.0	499.0	380.0

Table 79. — *Volume of growing stock on commercial forest land in the National forest geographical sampling unit, by county and stand-size class, 1961*

County[1]	Sawtimber stands	Poletimber stands	Other stands	Total Volume	Total Error
	Million cu. ft.	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Percent*
Grant	11.9	3.8	0.1	15.8	2
Greenbrier	100.6	36.7	2.3	139.6	3
Hampshire	3.0	.8	0	3.8	13
Hardy	53.1	15.9	1.1	70.1	4
Nicholas	24.8	7.0	.2	32.0	4
Pendleton	124.4	24.9	1.8	151.1	3
Pocahontas	288.0	75.9	5.9	369.8	2
Preston	4.3	1.2	0	5.5	7
Randolph	161.2	57.8	2.7	221.7	3
Tucker	86.3	29.7	2.3	118.3	3
Webster	70.4	16.3	.6	87.3	3
Total	928.0	270.0	17.0	1,215.0	2

[1] Volumes are for partial counties only; for volumes for the entire county, see table 80.

Table 80. — *Volume of growing stock in counties within both the National forest and the Northeastern or Southern sampling units, by stand-size class, 1961*

County	Sawtimber stands	Poletimber stands	Other stands	Total Volume	Total Error
	Million cu. ft.	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Percent*
Grant	141.0	68.5	10.1	219.6	5
Greenbrier	391.5	129.0	33.9	554.4	4
Hampshire	195.0	83.1	14.2	292.3	5
Hardy	209.6	90.1	11.7	311.4	5
Nicholas	263.1	82.3	20.7	366.1	4
Pendleton	306.9	97.4	8.4	412.7	4
Pocahontas	430.0	139.5	21.2	590.7	5
Preston	167.6	74.7	11.1	253.4	5
Randolph	454.5	175.6	21.6	651.7	4
Tucker	165.6	68.8	16.0	250.4	5
Webster	219.2	92.0	15.1	326.3	3
Total	2,944.0	1,101.0	184.0	4,229.0	2

Table 81. — *Volume of growing stock on commercial forest land in the Northeastern geographical sampling unit, by county and stand-size class, 1961*

County	Sawtimber stands	Poletimber stands	Other stands	Total	
				Volume	Error
	Million cu. ft.	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Per-cent*
Barbour	58.3	30.8	9.4	98.5	8
Berkeley	57.4	27.3	5.1	89.8	9
Braxton	132.1	48.9	12.0	193.0	7
Grant*	129.1	64.7	10.0	203.8	5
Hampshire*	192.0	82.3	14.2	288.5	5
Hardy*	156.5	74.2	10.6	241.3	5
Harrison	67.3	25.1	5.6	98.0	10
Jefferson	21.0	6.3	1.6	28.9	20
Lewis	64.0	30.5	9.4	103.9	9
Mineral	117.6	40.3	7.5	165.4	6
Morgan	70.5	31.1	5.9	107.5	6
Pendleton*	182.5	72.4	6.6	261.5	5
Pocahontas*	142.1	63.5	15.3	220.9	10
Preston*	163.3	73.5	11.1	247.9	5
Randolph*	293.4	117.7	18.9	430.0	5
Taylor	28.0	12.6	3.3	43.9	12
Tucker*	79.3	39.1	13.7	132.1	7
Upshur	85.8	30.1	6.3	122.2	8
Webster*	148.8	75.6	14.5	238.9	4
Total	2,189.0	946.0	181.0	3,316.0	3

* Volumes are shown only for the area outside the National forest; for volumes for the entire county, see table 80.

Table 82. — *Volume of growing stock on commercial forest land in the Southern geographical sampling unit, by county and stand-size class, 1961*

County	Sawtimber stands	Poletimber stands	Other stands	Total	
				Volume	Error
	Million cu. ft.	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Per-cent*
Boone	251.7	65.7	18.3	335.7	3
Clay	103.3	46.7	17.3	167.3	4
Fayette	260.4	73.7	36.4	370.5	4
Greenbrier*	291.0	92.2	31.6	414.8	4
Kanawha	324.7	113.8	31.9	470.4	3
Logan	225.9	59.2	17.6	302.7	4
McDowell	192.7	82.1	25.3	300.1	3
Mercer	95.6	49.4	14.2	159.2	5
Mingo	169.7	62.8	22.5	255.0	3
Monroe	87.5	49.1	21.7	158.3	5
Nicholas*	238.3	75.3	20.5	334.1	4
Raleigh	197.0	65.0	38.4	300.4	4
Summers	113.0	40.1	11.7	164.8	5
Wyoming	215.2	68.9	21.6	305.7	3
Total	2,766.0	944.0	329.0	4,039.0	2

* Volumes are shown only for the area outside the National forest; for volumes for the entire county, see table 80.

Table 83. — *Volume of growing stock on commercial forest land in the Northwestern geographical sampling unit, by county and stand-size class, 1961*

County	Sawtimber stands	Poletimber stands	Other stands	Total	
				Volume	Error
	Million cu. ft.	*Million cu. ft.*	*Million cu. ft.*	*Million cu. ft.*	*Per-cent*
Brooke	14.4	5.1	1.0	20.5	20
Cabell	76.5	25.1	4.8	106.4	9
Calhoun	82.8	29.1	5.3	117.2	8
Doddridge	90.0	24.5	4.4	118.9	9
Gilmer	96.4	33.8	5.7	135.9	8
Hancock	19.7	6.4	1.4	27.5	15
Jackson	98.3	29.4	7.2	134.9	8
Lincoln	122.9	49.5	9.5	181.9	7
Marion	78.0	24.8	5.4	108.2	9
Marshall	78.8	24.0	5.1	107.9	9
Mason	95.9	31.8	7.0	134.7	8
Monongalia	72.7	27.9	4.4	105.0	9
Ohio	21.6	6.5	1.7	29.8	17
Pleasants	34.7	12.8	2.6	50.1	11
Putnam	97.6	35.6	6.4	139.6	7
Ritchie	116.1	39.5	8.3	163.9	7
Roane	104.5	34.7	7.7	146.9	8
Tyler	53.7	21.4	3.9	79.0	10
Wayne	131.8	55.6	8.6	196.0	7
Wetzel	139.6	35.4	6.9	181.9	7
Wirt	66.7	20.2	3.9	90.8	9
Wood	80.3	27.9	5.8	114.0	9
Total	1,773.0	601.0	117.0	2,491.0	4

Table 84. — *Volume of sawtimber on commercial forest land in the National forest geographical sampling unit, by county and stand-size class, 1961*

County[1]	Sawtimber stands	Poletimber stands	Other stands	Total Volume	Total Error
	Million bd. ft.	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Percent*
Grant	34.4	4.5	0.1	39.0	10
Greenbrier	295.1	35.7	.6	331.4	5
Hampshire	8.5	.8	0	9.3	19
Hardy	152.7	16.2	.4	169.3	6
Nicholas	70.0	7.6	.1	77.7	6
Pendleton	364.1	29.5	.3	393.9	5
Pocahontas	782.1	86.5	.9	869.5	4
Preston	12.2	1.4	0	13.6	10
Randolph	438.2	56.9	1.0	496.1	4
Tucker	249.8	29.4	.4	279.6	5
Webster	193.9	19.5	.2	213.6	4
Total	2,601.0	288.0	4.0	2,893.0	3

[1] Volumes are for partial counties only; for volumes for the entire county, see table 85.

Table 85. — *Volume of sawtimber in counties within both the National forest and the Northeastern or Southern sampling units, by stand-size class, 1961*

County	Sawtimber stands	Poletimber stands	Other stands	Total Volume	Total Error
	Million bd. ft.	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Percent*
Grant	435.9	83.2	11.1	530.2	8
Greenbrier	1,245.0	171.0	30.0	1,446.0	5
Hampshire	613.1	105.9	19.1	738.1	7
Hardy	633.6	110.4	19.1	763.1	7
Nicholas	823.4	117.4	20.7	961.5	5
Pendleton	938.1	113.8	8.2	1,060.1	7
Pocahontas	1,186.3	161.1	11.8	1,359.2	7
Preston	529.2	94.4	16.2	639.8	8
Randolph	1,401.6	197.2	19.9	1,618.7	6
Tucker	496.0	77.0	12.9	585.9	8
Webster	650.8	108.6	17.0	776.4	6
Total	8,953.0	1,340.0	186.0	10,479.0	5

Table 86. — *Volume of sawtimber on commercial forest land in the Northeastern geographical sampling unit, by county and stand-size class, 1961*

County	Sawtimber stands	Poletimber stands	Other stands	Total Volume	Total Error
	Million bd. ft.	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Percent*
Barbour	199.7	37.4	14.3	251.4	10
Berkeley	183.2	35.6	6.5	225.3	11
Braxton	441.5	62.0	19.9	523.4	8
Grant*	401.4	78.7	11.0	491.1	7
Hampshire*	604.6	105.1	19.1	728.8	7
Hardy*	480.8	94.2	18.8	593.8	7
Harrison	224.7	34.2	10.6	269.5	11
Jefferson	70.3	9.2	1.3	80.8	22
Lewis	219.9	38.1	6.9	264.9	10
Mineral	385.1	51.1	8.4	444.6	8
Morgan	225.3	38.6	6.9	270.8	9
Pendleton*	573.9	84.3	7.9	666.1	8
Pocahontas*	403.8	74.6	11.0	489.4	13
Preston*	517.0	93.0	16.2	626.2	7
Randolph*	963.1	140.3	19.0	1,122.4	7
Taylor	91.7	16.4	6.1	114.2	14
Tucker*	246.1	47.6	12.5	306.2	10
Upshur	283.1	38.5	11.8	333.4	10
Webster*	456.8	89.1	16.8	562.7	6
Total	6,972.0	1,168.0	225.0	8,365.0	5

* Volumes are shown only for the area outside the National forest; for volumes for the entire county, see table 85.

Table 87. — *Volume of sawtimber on commercial forest land in the Southern geographical sampling unit, by county and stand-size class, 1961*

County	Sawtimber stands	Poletimber stands	Other stands	Total Volume	Total Error
	Million bd. ft.	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Percent*
Boone	820.8	90.1	19.3	930.2	5
Clay	332.5	67.2	17.1	416.8	6
Fayette	876.1	112.5	39.4	1,028.0	5
Greenbrier*	949.8	135.3	29.5	1,114.6	5
Kanawha	1,057.5	165.3	31.2	1,254.0	5
Logan	761.2	83.2	18.7	863.1	5
McDowell	614.3	117.0	24.9	756.2	5
Mercer	305.3	73.0	12.0	390.3	7
Mingo	543.4	87.3	22.9	653.6	5
Monroe	289.2	72.4	19.9	381.5	7
Nicholas*	753.4	109.7	20.7	883.8	5
Raleigh	667.9	97.8	41.2	806.9	5
Summers	359.5	56.4	11.1	427.0	6
Wyoming	714.1	98.8	22.1	835.0	5
Total	9,045.0	1,366.0	330.0	10,741.0	4

* Volumes are shown only for the area outside the National forest; for volumes for the entire county, see table 85.

Table 88. — *Volume of sawtimber on commercial forest land in the Northwestern geographical sampling unit, by county and stand-size class, 1961*

County	Sawtimber stands	Poletimber stands	Other stands	Total Volume	Total Error
	Million bd. ft.	*Million bd. ft.*	*Million bd. ft.*	*Million bd. ft.*	*Per-cent*
Brooke	44.0	6.8	4.6	55.4	23
Cabell	236.0	31.7	21.2	288.9	11
Calhoun	249.2	38.4	23.6	311.2	11
Doddridge	279.5	32.3	19.6	331.4	11
Gilmer	299.1	44.1	25.9	369.1	10
Hancock	59.6	8.6	5.7	73.9	18
Jackson	281.3	39.7	32.3	353.3	10
Lincoln	369.4	63.7	42.5	475.6	9
Marion	244.2	32.3	23.9	300.4	11
Marshall	253.1	31.9	22.8	307.8	11
Mason	292.1	43.9	31.2	367.2	10
Monongalia	227.6	36.1	23.0	286.7	11
Ohio	68.5	8.9	7.6	85.0	20
Pleasants	106.1	17.2	11.6	134.9	13
Putnam	304.8	46.4	26.9	378.1	9
Ritchie	364.2	53.3	37.0	454.5	9
Roane	316.5	47.0	34.4	397.9	10
Tyler	167.1	27.9	17.4	212.4	12
Wayne	409.1	74.4	38.4	521.9	9
Wetzel	434.9	47.2	29.1	511.2	10
Wirt	206.8	26.9	17.4	251.1	12
Wood	249.9	36.3	25.9	312.1	11
Total	5,463.0	795.0	522.0	6,780.0	5

Table 89. — *Volume of growing stock on commercial forest land in the National forest geographical sampling unit, by county and species, 1961*

(In millions of cubic feet)

County[1]	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Grant	0.4	0.6	0.7	1.7	0.6	1.7
Greenbrier	3.5	5.2	6.5	15.2	4.9	15.2
Hampshire	.1	.1	.2	.4	.1	.5
Hardy	1.5	2.3	3.1	6.9	2.8	8.5
Nicholas	.7	1.1	1.7	3.5	1.2	3.7
Pendleton	3.2	4.9	7.0	15.1	5.9	16.7
Pocahontas	9.8	13.6	19.7	43.1	13.0	40.0
Preston	.2	.2	.2	.6	.2	.7
Randolph	6.0	8.3	12.2	26.5	7.7	23.0
Tucker	2.8	4.5	6.1	13.4	4.3	12.4
Webster	1.8	3.2	4.6	9.6	3.3	9.6
Total	30.0	44.0	62.0	136.0	44.0	132.0

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Grant	1.7	0.5	0.5	1.2	1.1	1.1
Greenbrier	14.0	3.9	4.4	10.2	8.6	10.3
Hampshire	.4	.1	.1	.3	.3	.3
Hardy	7.0	1.9	2.4	4.8	5.0	5.5
Nicholas	2.9	.9	1.1	2.2	2.5	2.5
Pendleton	14.3	4.3	4.6	9.9	12.6	11.2
Pocahontas	31.4	10.9	12.4	25.4	27.8	27.6
Preston	.5	.1	.2	.4	.4	.4
Randolph	18.8	6.7	7.8	15.3	15.8	16.3
Tucker	10.7	3.2	3.6	8.6	8.9	9.2
Webster	7.3	2.5	2.9	5.7	7.0	6.6
Total	109.0	35.0	40.0	84.0	90.0	91.0

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwoods
Grant	1.7	0.4	0.9	1.4	1.3	14.1
Greenbrier	16.1	3.9	7.2	12.3	13.4	124.4
Hampshire	.4	.1	.1	.3	.4	3.4
Hardy	7.5	2.0	3.0	5.7	7.1	63.2
Nicholas	3.2	.9	1.5	2.8	3.1	28.5
Pendleton	18.0	4.0	6.8	13.5	14.2	136.0
Pocahontas	35.7	10.0	19.1	35.1	38.3	326.7
Preston	.6	.2	.2	.5	.5	4.9
Randolph	21.5	6.0	11.5	21.8	23.0	195.2
Tucker	12.8	3.0	5.6	11.2	11.4	104.9
Webster	8.5	2.5	4.1	8.4	9.3	77.7
Total	126.0	33.0	60.0	113.0	122.0	1,079.0

[1] Volumes are for partial counties only; for volumes for the entire county, see table 90.

Table 90. — *Volume of growing stock in counties within both the National forest and the Northeastern or Southern sampling units, by species, 1961*

(In millions of cubic feet)

County	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Grant	7.5	1.7	3.1	12.3	17.4	23.7
Greenbrier	8.3	10.8	11.1	30.2	30.6	58.3
Hampshire	9.8	1.8	3.2	14.8	24.3	33.5
Hardy	10.3	4.6	5.6	20.5	20.3	35.7
Nicholas	4.4	4.9	5.7	15.0	22.2	42.3
Pendleton	12.4	7.3	10.1	29.8	23.2	46.4
Pocahontas	15.7	14.4	22.6	52.7	30.0	63.7
Preston	8.8	2.2	3.2	14.2	18.8	26.1
Randolph	18.4	11.1	17.5	47.0	45.9	75.4
Tucker	7.2	6.5	7.5	21.2	15.0	28.4
Webster	9.2	4.7	7.4	21.3	23.3	35.5
Total	112.0	70.0	97.0	279.0	271.0	469.0

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Grant	31.1	15.6	16.9	3.7	15.9	13.2
Greenbrier	52.4	52.4	49.5	15.1	28.7	33.2
Hampshire	43.1	24.6	22.4	3.7	20.8	16.1
Hardy	42.3	22.0	20.2	7.6	21.7	19.3
Nicholas	35.9	37.0	38.1	4.3	18.4	21.1
Pendleton	53.0	25.2	21.6	12.0	31.4	27.6
Pocahontas	67.5	28.9	29.8	27.5	42.3	41.8
Preston	39.7	22.3	17.6	2.6	17.1	15.1
Randolph	77.6	32.4	40.3	19.5	47.4	42.4
Tucker	28.2	12.3	12.6	10.1	17.9	17.2
Webster	43.2	22.3	22.0	7.9	23.4	20.0
Total	514.0	295.0	291.0	114.0	285.0	267.0

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwoods
Grant	11.7	6.4	19.1	14.5	18.1	207.3
Greenbrier	39.5	20.5	62.7	24.6	56.7	524.2
Hampshire	14.2	8.5	23.9	19.4	23.0	277.5
Hardy	19.9	9.2	22.9	23.1	26.7	290.9
Nicholas	21.1	13.4	42.0	13.8	41.5	351.1
Pendleton	33.2	12.7	28.3	31.7	36.6	382.9
Pocahontas	45.7	16.9	38.4	48.6	56.9	538.0
Preston	13.2	7.6	21.3	17.3	20.5	239.2
Randolph	47.1	20.7	47.8	49.8	58.4	604.7
Tucker	20.3	6.9	18.0	20.1	22.2	229.2
Webster	19.1	9.2	26.6	22.1	30.4	305.0
Total	285.0	132.0	351.0	285.0	391.0	3,950.0

Table 91. — *Volume of growing stock on commercial forest land in the Northeastern geographical sampling unit, by county and species, 1961*

(In millions of cubic feet)

County	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Barbour	4.4	0.5	0.6	5.5	13.2	11.9
Berkeley	3.0	.7	.9	4.6	8.4	8.9
Braxton	7.0	.9	1.7	9.6	19.6	21.9
Grant*	7.1	1.1	2.4	10.6	16.8	22.0
Hampshire*	9.7	1.7	3.0	14.4	24.2	33.0
Hardy*	8.8	2.3	2.5	13.6	17.5	27.2
Harrison	4.0	.4	.5	4.9	11.3	14.1
Jefferson	.9	.2	.2	1.3	3.2	3.1
Lewis	4.3	.7	.9	5.9	9.6	9.8
Mineral	5.1	1.1	1.5	7.7	16.3	20.9
Morgan	3.5	.7	1.2	5.4	9.5	12.4
Pendleton*	9.2	2.4	3.1	14.7	17.3	29.7
Pocahontas*	6.0	.9	2.7	9.6	17.0	23.6
Preston*	8.6	2.0	3.0	13.6	18.6	25.4
Randolph*	12.5	2.9	5.2	20.6	38.2	52.4
Taylor	1.7	.2	.3	2.2	5.2	4.8
Tucker*	4.4	2.0	1.4	7.8	10.7	16.0
Upshur	4.4	.8	1.1	6.3	11.4	14.0
Webster*	7.4	1.5	2.8	11.7	20.0	25.9
Total	112.0	23.0	35.0	170.0	288.0	377.0

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Barbour	10.9	6.4	6.3	1.8	5.2	6.5
Berkeley	12.6	6.8	7.3	1.1	6.7	5.0
Braxton	25.3	13.7	14.3	2.5	13.9	11.3
Grant*	29.4	15.1	16.4	2.5	14.8	12.1
Hampshire*	42.7	24.5	22.3	3.4	20.5	15.8
Hardy*	35.3	20.1	17.8	2.8	16.7	13.8
Harrison	10.2	7.0	6.5	1.9	5.6	6.3
Jefferson	4.1	1.9	2.2	.4	2.1	1.8
Lewis	14.3	9.6	7.9	1.3	6.9	6.2
Mineral	23.1	10.8	11.8	2.0	11.8	9.3
Morgan	15.1	7.9	8.0	1.2	7.7	6.1
Pendleton*	38.6	20.9	17.0	2.1	18.9	16.3
Pocahontas*	36.1	17.9	17.4	2.3	14.7	14.1
Preston*	39.2	22.2	17.4	2.2	16.7	14.7
Randolph*	58.7	25.6	32.4	4.4	31.8	26.0
Taylor	5.6	2.6	3.1	.9	2.7	2.8
Tucker*	17.5	9.1	9.0	1.5	9.0	8.0
Upshur	16.4	8.1	8.8	1.5	8.9	7.5
Webster*	35.9	19.8	19.1	2.2	16.4	13.4
Total	471.0	250.0	245.0	38.0	231.0	197.0

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Table 91 — *continued*

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwoods
Barbour	4.4	2.2	9.5	6.9	7.8	93.0
Berkeley	4.7	3.0	7.9	5.9	6.9	85.2
Braxton	10.7	5.9	17.4	12.2	14.7	183.4
Grant*	10.0	6.0	18.2	13.1	16.8	193.2
Hampshire*	13.8	8.4	23.8	19.1	22.6	274.1
Hardy*	12.4	7.2	19.9	17.4	19.6	227.7
Harrison	4.0	1.8	10.3	7.0	7.1	93.1
Jefferson	1.4	.9	2.5	2.0	2.0	27.6
Lewis	5.0	2.9	9.7	6.4	8.4	98.0
Mineral	9.4	5.4	13.9	10.7	12.3	157.7
Morgan	5.9	3.3	9.7	6.8	8.5	102.1
Pendleton*	15.4	8.6	21.5	18.1	22.4	246.8
Pocahontas*	10.1	6.8	19.3	13.4	18.6	211.3
Preston*	12.6	7.4	21.1	16.8	20.0	234.3
Randolph*	25.9	14.5	36.2	27.8	35.5	409.4
Taylor	2.2	1.3	4.3	2.8	3.4	41.7
Tucker*	7.5	3.9	12.4	8.9	10.8	124.3
Upshur	7.0	3.8	10.9	8.0	9.6	115.9
Webster*	10.6	6.7	22.5	13.7	21.0	227.2
Total	173.0	100.0	291.0	217.0	268.0	3,146.0

* Volumes are shown only for the area outside the National forest; for volumes for the entire county, see table 90.

Table 92. — *Volume of growing stock on commercial forest land in the Southern geographical sampling unit, by county and species, 1961*

(In millions of cubic feet)

County	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Boone	4.6	4.1	3.0	11.7	19.8	40.7
Clay	2.1	2.0	1.9	6.0	11.6	20.3
Fayette	4.3	6.1	4.3	14.7	21.8	38.5
Greenbrier*	4.8	5.6	4.6	15.0	25.7	43.1
Kanawha	5.3	5.7	4.6	15.6	29.1	52.0
Logan	3.2	3.7	2.4	9.3	17.3	37.6
McDowell	5.3	2.2	2.4	9.9	20.0	28.2
Mercer	1.9	1.8	1.8	5.5	11.8	16.6
Mingo	3.3	3.1	2.4	8.8	16.1	24.6
Monroe	2.8	1.9	1.6	6.3	12.1	14.9
Nicholas*	3.7	3.8	4.0	11.5	21.0	38.6
Raleigh	4.9	5.1	2.5	12.5	19.7	32.1
Summers	2.3	1.8	1.8	5.9	11.2	19.2
Wyoming	3.5	4.1	2.7	10.3	18.8	37.6
Total	52.0	51.0	40.0	143.0	256.0	444.0

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Table 92 — *continued*

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Boone	34.7	34.8	39.9	2.9	15.3	17.8
Clay	16.7	18.4	17.9	2.0	7.3	8.9
Fayette	33.9	41.7	41.4	3.8	18.3	20.4
Greenbrier*	38.4	48.5	45.1	4.9	20.1	22.9
Kanawha	44.2	61.5	53.2	3.8	20.3	26.4
Logan	28.8	28.8	35.9	1.6	15.7	15.6
McDowell	28.9	39.6	33.8	5.9	10.4	16.8
Mercer	15.9	16.6	16.2	1.5	6.3	8.3
Mingo	24.4	32.5	28.2	6.0	9.1	14.1
Monroe	16.3	18.6	16.5	1.9	5.6	8.7
Nicholas*	33.0	36.1	37.0	2.1	15.9	18.6
Raleigh	30.3	28.6	34.2	2.8	13.3	15.0
Summers	17.4	17.7	18.4	1.0	6.9	9.5
Wyoming	30.1	30.6	34.3	1.8	14.5	16.0
Total	393.0	454.0	452.0	42.0	179.0	219.0

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwood
Boone	18.9	13.7	38.2	9.2	38.1	324.0
Clay	7.9	5.4	20.8	5.2	18.9	161.3
Fayette	23.0	15.8	48.2	11.3	37.7	355.8
Greenbrier*	23.4	16.6	55.5	12.7	42.9	399.8
Kanawha	23.0	17.6	62.7	13.2	47.8	454.8
Logan	21.8	13.3	34.5	8.2	34.3	293.4
McDowell	14.1	10.1	41.9	8.3	32.2	290.2
Mercer	7.1	4.8	19.9	4.9	23.8	153.7
Mingo	13.5	8.6	35.7	6.9	26.5	246.2
Monroe	7.2	5.0	24.2	4.7	16.3	152.0
Nicholas*	17.9	12.5	40.5	11.0	38.4	322.6
Raleigh	18.1	12.1	40.4	7.7	33.6	287.9
Summers	7.2	5.7	20.9	5.0	18.8	158.9
Wyoming	18.9	12.8	36.6	8.7	34.7	295.4
Total	222.0	154.0	520.0	117.0	444.0	3,896.0

* Volumes are shown only for the area outside the National forest; for volumes for the entire county, see table 90.

Table 93. — *Volume of growing stock on commercial forest land in the Northwestern geographical sampling unit, by county and species, 1961*

(In millions of cubic feet)

County	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Brooke	0.9	0.1	0.0	1.0	2.8	2.5
Cabell	4.3	.3	.3	4.9	15.6	13.5
Calhoun	5.2	.4	.2	5.8	16.9	16.4
Doddridge	3.9	.5	.3	4.7	16.2	16.7
Gilmer	6.1	.4	.3	6.8	19.0	16.9
Hancock	1.0	.1	.1	1.2	3.8	3.8
ackson	5.0	.2	.3	5.5	20.8	16.5
Lincoln	9.0	.4	.3	9.7	24.6	21.5
Marion	4.4	.4	.2	5.0	15.1	14.9
Marshall	3.8	.3	.3	4.4	14.2	13.6
Mason	5.6	.3	.4	6.3	19.7	17.5
Monongalia	4.9	.3	.2	5.4	13.7	10.4
Ohio	1.0	.1	.1	1.2	3.7	4.2
Pleasants	2.2	.1	.2	2.5	6.8	6.1
Putnam	5.9	.5	.4	6.8	19.5	14.9
Ritchie	6.9	.4	.4	7.7	23.0	21.1
Roane	6.1	.4	.4	6.9	21.1	17.0
Tyler	3.8	.2	.2	4.2	11.4	8.3
Wayne	10.3	.4	.4	11.1	26.6	20.4
Wetzel	5.2	.6	.5	6.3	23.7	28.6
Wirt	3.5	.3	.2	4.0	12.6	13.2
Wood	5.0	.3	.3	5.6	16.2	14.0
Total	104.0	7.0	6.0	117.0	347.0	312.0

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
rooke	1.7	2.7	2.2	0.0	0.8	0.5
abell	7.9	15.7	11.6	.1	4.1	2.3
Calhoun	9.3	13.8	12.8	.1	3.8	3.1
Doddridge	9.3	16.3	13.1	.2	4.7	2.9
Gilmer	10.2	18.5	15.2	.1	5.1	3.2
Hancock	2.2	3.1	3.0	.0	1.0	.8
ackson	10.2	21.4	14.7	.1	4.8	3.2
incoln	14.2	20.3	20.1	.3	6.6	4.4
Marion	8.6	15.0	12.1	.1	3.9	2.9
Marshall	8.0	14.7	11.2	.2	4.8	2.8
Mason	10.2	19.4	14.5	.1	5.0	3.4
Monongalia	8.1	13.7	11.4	.1	4.2	2.6
Ohio	2.2	4.4	3.1	.0	1.3	.7
leasants	3.6	6.0	5.3	.0	2.0	1.3
utnam	9.9	18.6	15.0	.3	5.8	3.3
Ritchie	12.1	23.1	17.7	.1	6.4	4.1
Roane	11.2	21.8	16.4	.2	5.6	3.6
Tyler	5.8	10.9	8.2	.1	3.1	1.9

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Table 93 — *continued*

Wayne	14.3	24.8	21.5	.3	7.7	4.5
Wetzel	13.5	23.5	18.3	.3	7.6	4.5
Wirt	6.8	12.4	10.1	.1	3.3	2.3
Wood	8.7	16.9	12.5	.2	4.4	2.7
Total	188.0	337.0	270.0	3.0	96.0	61.0

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwoo
Brooke	0.8	0.3	1.3	1.5	2.4	19.5
Cabell	5.7	.4	7.2	6.6	10.8	101.5
Calhoun	5.4	2.1	8.3	7.5	11.9	111.4
Doddridge	7.2	2.3	7.4	6.8	11.1	114.2
Gilmer	6.8	2.4	9.5	8.4	13.8	129.1
Hancock	1.5	.6	1.8	1.8	2.9	26.3
Jackson	5.9	2.3	8.6	8.4	12.5	129.4
Lincoln	10.6	3.1	13.2	12.1	21.2	172.2
Marion	3.6	2.0	7.3	6.9	10.8	103.2
Marshall	7.4	2.2	6.6	6.5	11.3	103.5
Mason	5.0	2.5	9.2	9.0	12.9	128.4
Monongalia	6.5	1.8	7.2	7.4	12.5	99.6
Ohio	1.7	.6	1.8	1.8	3.1	28.6
Pleasants	3.0	1.0	3.5	3.4	5.6	47.6
Putnam	9.3	2.5	9.8	8.6	15.3	132.8
Ritchie	7.1	3.0	11.2	10.9	16.4	156.2
Roane	7.0	2.6	10.1	9.3	14.1	140.0
Tyler	4.4	1.4	5.4	5.2	8.7	74.8
Wayne	11.8	3.2	14.7	12.8	22.3	184.9
Wetzel	13.0	3.9	11.0	10.4	17.3	175.6
Wirt	3.8	1.8	6.2	5.6	8.6	86.8
Wood	4.5	2.0	7.7	7.1	11.5	108.4
Total	132.0	44.0	169.0	158.0	257.0	2,374.0

Table 94. — *Volume of sawtimber on commercial forest land in the National forest geographical sampling unit, by county and species, 1961*

(In millions of board feet)

County[1]	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Grant	1.2	2.0	2.1	5.3	1.4	4.9
Greenbrier	11.2	17.8	19.8	48.8	11.4	43.5
Hampshire	.3	.5	.5	1.3	.3	1.3
Hardy	4.6	7.8	10.7	23.1	6.9	24.4
Nicholas	2.0	4.3	5.2	11.5	2.9	10.8
Pendleton	8.8	18.8	21.9	49.5	14.3	52.0
Pocahontas	27.9	52.3	58.6	138.8	31.0	111.5
Preston	.4	.8	.8	2.0	.4	2.0
Randolph	17.9	30.1	37.2	85.2	18.0	60.3
Tucker	9.3	16.3	17.6	43.2	10.3	35.8
Webster	5.4	12.3	15.6	33.3	8.1	27.5
Total	89.0	163.0	190.0	442.0	105.0	374.0

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Grant	3.9	1.0	0.9	2.0	3.5	1.8
Greenbrier	32.7	6.6	7.6	17.8	25.3	13.9
Hampshire	.9	.3	.2	.4	.8	.4
Hardy	16.2	4.2	5.0	8.1	13.7	7.3
Nicholas	6.4	2.7	2.4	3.5	6.4	3.3
Pendleton	37.9	12.8	10.5	17.5	36.7	17.8
Pocahontas	69.3	31.0	25.7	43.0	66.2	36.1
Preston	1.2	.4	.4	.7	1.1	.6
Randolph	39.9	14.6	15.2	25.1	36.9	19.7
Tucker	25.0	7.9	7.4	13.1	23.5	12.5
Webster	16.6	7.5	6.7	9.8	16.9	8.6
Total	250.0	89.0	82.0	141.0	231.0	122.0

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwoods
Grant	5.4	0.8	2.9	3.1	2.1	33.7
Greenbrier	46.8	8.5	22.7	24.2	21.6	282.6
Hampshire	1.2	.3	.4	.8	.7	8.0
Hardy	18.6	4.6	10.5	13.1	13.6	146.2
Nicholas	8.2	2.1	5.0	6.8	5.7	66.2
Pendleton	54.6	8.4	20.3	35.4	26.2	344.4
Pocahontas	92.3	22.6	62.9	81.6	57.5	730.7
Preston	1.6	.4	.8	1.1	.9	11.6
Randolph	53.0	13.2	36.6	46.4	32.0	410.9
Tucker	35.3	6.5	17.0	23.9	18.2	236.4
Webster	23.0	5.6	13.9	20.6	15.5	180.3
Total	340.0	73.0	193.0	257.0	194.0	2,451.0

[1] Volumes are for partial counties only; for volumes for the entire county, see table 95.

Table 95. — *Volume of sawtimber in counties within both the National forest and the Northeastern or Southern sampling units, by species, 1961*

(In millions of board feet)

County	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Grant	17.1	7.2	10.0	34.3	49.4	67.0
Greenbrier	29.6	31.5	27.9	89.0	71.2	166.4
Hampshire	25.3	7.3	10.1	42.7	72.1	97.9
Hardy	24.7	14.4	22.6	61.7	57.1	99.9
Nicholas	14.6	12.8	13.6	41.0	51.1	108.4
Pendleton	34.5	27.3	32.4	94.2	61.9	114.2
Pocahontas	44.0	57.3	64.1	165.4	73.4	167.7
Preston	22.1	8.2	11.1	41.4	55.7	64.9
Randolph	49.7	42.0	54.8	146.5	129.3	206.1
Tucker	21.8	19.7	21.6	63.1	39.8	79.4
Webster	22.6	18.3	21.8	62.7	63.0	99.1
Total	306.0	246.0	290.0	842.0	724.0	1,271.0

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Grant	65.9	37.2	34.2	6.5	34.3	19.6
Greenbrier	145.5	159.8	131.8	37.6	77.2	60.3
Hampshire	94.1	56.7	49.2	4.9	45.9	24.8
Hardy	91.8	47.3	42.8	12.4	51.4	29.1
Nicholas	95.7	131.9	100.5	15.8	41.7	44.8
Pendleton	130.0	88.9	50.2	20.9	72.6	44.4
Pocahontas	144.4	79.9	59.4	46.5	90.4	53.8
Preston	90.9	72.5	40.6	5.2	33.4	23.0
Randolph	177.3	109.0	88.7	32.6	112.5	60.6
Tucker	57.9	31.2	26.6	15.9	42.6	23.7
Webster	94.5	58.6	47.0	13.7	47.0	25.9
Total	1,188.0	873.0	671.0	212.0	649.0	410.0

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwood
Grant	33.5	18.2	51.9	32.4	45.8	495.9
Greenbrier	120.7	56.8	156.9	52.7	120.1	1,357.0
Hampshire	42.7	25.9	67.6	46.3	67.3	695.4
Hardy	55.7	25.9	66.2	55.7	66.1	701.4
Nicholas	57.1	38.5	116.9	29.3	88.8	920.5
Pendleton	102.5	34.2	80.8	75.3	90.0	965.9
Pocahontas	117.4	39.2	108.9	110.9	101.9	1,193.8
Preston	28.0	23.4	60.2	39.6	61.0	598.4
Randolph	131.7	56.9	140.2	106.6	120.7	1,472.2
Tucker	56.7	16.9	46.3	41.1	44.7	522.8
Webster	53.0	25.1	69.1	50.1	67.6	713.7
Total	799.0	361.0	965.0	640.0	874.0	9,637.0

Table 96. — *Volume of sawtimber on commercial forest land in the Northeastern geographical sampling unit, by county and species, 1961*

(In millions of board feet)

County	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Barbour	8.4	1.7	1.4	11.5	32.3	28.3
Berkeley	8.4	2.5	2.9	13.8	24.2	26.5
Braxton	14.2	4.8	8.3	27.3	57.5	66.2
Grant*	15.9	5.2	7.9	29.0	48.0	62.1
Hampshire*	25.0	6.8	9.6	41.4	71.8	96.6
Hardy*	20.1	6.6	11.9	38.6	50.2	75.5
Harrison	6.8	1.4	1.2	9.4	33.2	58.2
Jefferson	2.8	.6	.8	4.2	9.5	9.9
Lewis	9.6	2.7	3.2	15.5	27.8	29.7
Mineral	13.8	4.3	5.1	23.2	48.9	63.0
Morgan	8.1	2.9	4.0	15.0	27.8	36.6
Pendleton*	25.7	8.5	10.5	44.7	47.7	62.1
Pocahontas*	16.2	5.1	5.4	26.7	42.4	56.2
Preston*	21.7	7.4	10.3	39.4	55.3	62.8
Randolph*	31.8	12.1	17.5	61.4	111.6	145.7
Taylor	3.9	.8	1.2	5.9	14.5	13.7
Tucker*	12.5	3.4	4.0	19.9	29.5	43.6
Upshur	11.9	3.2	3.6	18.7	32.9	41.7
Webster*	17.2	6.0	6.2	29.4	54.9	71.6
Total	274.0	86.0	115.0	475.0	820.0	1,050.0

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Barbour	29.1	26.5	15.6	5.2	14.6	6.5
Berkeley	26.8	18.1	17.0	1.1	13.9	7.2
Braxton	62.1	52.7	36.8	5.5	32.9	15.6
Grant*	62.0	36.2	33.3	4.5	30.8	17.8
Hampshire*	93.2	56.4	49.0	4.5	45.1	24.4
Hardy*	75.6	43.1	37.8	4.3	37.7	21.8
Harrison	34.8	20.8	17.5	5.1	13.7	5.9
Jefferson	10.2	8.0	5.5	.8	5.1	2.5
Lewis	35.2	29.1	17.6	2.9	13.3	9.0
Mineral	53.9	34.7	26.7	3.4	30.3	13.8
Morgan	33.4	21.2	18.0	1.9	16.6	9.0
Pendleton*	92.3	76.1	39.7	3.3	35.8	26.6
Pocahontas*	75.3	48.9	33.9	3.4	24.0	17.7
Preston*	89.7	72.1	40.2	4.5	32.3	22.4
Randolph*	137.4	94.3	73.7	7.4	75.4	41.0
Taylor	12.9	12.1	6.9	2.0	6.9	3.5
Tucker*	32.9	23.3	19.2	2.8	19.1	11.2
Upshur	41.3	33.3	22.3	3.5	20.4	10.8
Webster*	77.9	51.1	40.3	3.9	30.1	17.3
Total	1,076.0	758.0	551.0	70.0	498.0	284.0

CONTINUED

Table 96 — *continued*

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwoods
Barbour	10.0	7.4	28.2	18.5	17.7	239.9
Berkeley	14.3	8.2	21.7	12.9	19.6	211.5
Braxton	32.3	18.2	47.5	28.6	40.2	496.1
Grant*	28.1	17.4	49.0	29.3	43.6	462.1
Hampshire*	41.5	25.6	67.2	45.5	66.6	687.4
Hardy*	37.1	21.3	55.7	42.6	52.5	555.2
Harrison	6.7	7.5	23.6	23.6	9.5	260.1
Jefferson	4.3	2.6	6.8	5.5	5.9	76.6
Lewis	15.0	8.5	24.3	14.0	23.0	249.4
Mineral	29.6	16.6	40.8	25.3	34.4	421.4
Morgan	17.7	10.0	25.7	14.7	23.2	255.8
Pendleton*	47.9	25.9	60.4	39.9	63.7	621.4
Pocahontas*	25.2	16.6	45.8	29.3	44.0	462.7
Preston*	26.4	23.0	59.4	38.5	60.2	586.8
Randolph*	78.7	43.8	103.4	60.3	88.3	1,061.0
Taylor	5.8	3.6	11.8	7.1	7.5	108.3
Tucker*	21.4	10.4	29.3	17.2	26.4	286.3
Upshur	21.0	11.9	30.2	18.7	26.7	314.7
Webster*	30.0	19.5	55.2	29.5	52.0	533.3
Total	493.0	298.0	786.0	501.0	705.0	7,890.0

* Volumes are shown only for the area outside the National forest; for volumes for the entire county, see table 95.

Table 97.—*Volume of sawtimber on commercial forest land in the Southern geographical sampling unit, by county and species, 1961*

(In millions of board feet)

County	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Boone	12.6	10.0	8.3	30.9	47.1	110.5
Clay	6.2	4.6	4.4	15.2	24.2	45.0
Fayette	14.6	14.2	8.0	36.8	53.2	114.8
Greenbrier*	18.4	13.7	8.1	40.2	59.8	122.9
Kanawha	15.4	13.3	12.5	41.2	68.1	143.6
Logan	8.8	8.9	7.0	24.7	42.5	102.5
McDowell	18.0	6.5	4.2	28.7	45.6	82.7
Mercer	8.6	4.1	2.9	15.6	25.6	40.9
Mingo	13.3	8.1	3.8	25.2	37.3	70.6
Monroe	11.0	4.8	2.0	17.8	26.1	39.2
Nicholas*	12.6	8.5	8.4	29.5	48.2	97.6
Raleigh	15.0	11.9	6.3	33.2	45.6	89.1
Summers	6.7	4.1	4.4	15.2	24.9	47.9
Wyoming	9.8	10.3	6.7	26.8	41.8	96.7
Total	171.0	123.0	87.0	381.0	590.0	1,204.0

CONTINUED

Table 97 — *continued*

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Boone	97.1	130.6	109.0	13.4	36.2	40.6
Clay	44.0	67.0	44.4	5.3	13.6	18.8
Fayette	102.4	143.5	117.6	16.8	48.8	45.3
Greenbrier*	112.8	153.2	124.2	19.8	51.9	46.4
Kanawha	127.1	185.7	139.3	16.9	50.0	55.5
Logan	81.3	113.1	100.5	10.4	43.5	38.0
McDowell	81.0	110.5	81.6	9.3	23.3	30.4
Mercer	43.8	58.5	40.6	2.2	13.3	16.1
Mingo	70.6	94.4	72.0	10.7	21.3	24.8
Monroe	45.5	56.6	40.6	2.9	12.1	14.9
Nicholas*	89.3	129.2	98.1	12.3	35.3	41.5
Raleigh	87.1	120.7	91.4	12.0	32.2	35.0
Summers	46.8	64.4	47.5	4.4	13.7	20.1
Wyoming	84.2	116.6	93.2	11.6	35.8	36.6
Total	1,113.0	1,544.0	1,200.0	148.0	431.0	464.0

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwoods
Boone	51.4	40.9	116.4	19.7	86.4	899.3
Clay	23.0	14.9	55.1	10.7	35.6	401.6
Fayette	72.3	47.6	114.6	24.7	89.6	991.2
Greenbrier*	73.9	48.3	134.2	28.8	98.2	1,074.4
Kanawha	74.6	51.3	161.3	27.1	112.3	1,212.8
Logan	61.4	40.8	107.9	17.8	78.7	838.4
McDowell	42.6	26.4	106.6	17.8	69.7	727.5
Mercer	20.8	13.0	54.1	10.6	35.2	374.7
Mingo	42.8	21.2	90.1	15.0	57.6	628.4
Monroe	23.7	12.0	48.9	9.3	31.9	363.7
Nicholas*	48.9	36.4	111.9	22.5	83.1	854.3
Raleigh	51.4	34.8	90.5	15.0	68.9	773.7
Summers	19.3	15.8	57.2	10.1	39.7	411.8
Wyoming	52.9	37.6	109.2	18.9	73.1	808.2
Total	659.0	441.0	1,358.0	248.0	960.0	10,360.0

* Volumes are shown only for the area outside the National forest; for volumes for the entire county, see table 95.

Table 98. — *Volume of sawtimber on commercial forest land in the Northwestern geographical sampling unit, by county and species, 1961*

(In millions of board feet)

County	Yellow pines	Hemlock	Other softwoods	Total softwoods	White oak	Northern red oak
Brooke	2.2	0.1	0.2	2.5	7.7	7.3
Cabell	10.6	.5	1.2	12.3	40.8	35.1
Calhoun	13.4	.5	.7	14.6	44.5	44.5
Doddridge	10.4	.6	1.0	12.0	44.2	46.4
Gilmer	15.3	.6	1.0	16.9	49.5	48.2
Hancock	3.0	.1	.2	3.3	11.2	10.6
Jackson	12.6	.6	1.2	14.4	53.0	39.0
Lincoln	21.0	1.4	1.2	23.6	63.2	64.4
Marion	11.4	.5	1.0	12.9	42.4	42.6
Marshall	10.1	.4	1.2	11.7	40.2	39.5
Mason	14.5	.6	1.5	16.6	53.1	45.1
Monongalia	11.9	.8	.7	13.4	37.4	35.3
Ohio	2.8	.1	.2	3.1	10.6	10.8
Pleasants	5.7	.4	.5	6.6	18.5	16.8
Putnam	15.1	.6	1.5	17.2	50.1	45.3
Ritchie	17.8	.9	1.5	20.2	61.8	57.4
Roane	15.7	.8	1.2	17.7	55.6	48.9
Tyler	9.4	.4	.7	10.5	29.3	24.1
Wayne	24.5	1.3	1.5	27.3	68.0	64.8
Wetzel	14.1	.8	1.8	16.7	64.9	73.6
Wirt	8.9	.5	1.0	10.4	34.4	34.6
Wood	12.6	.5	1.0	14.1	43.6	39.7
Total	263.0	13.0	22.0	298.0	924.0	874.0

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Brooke	5.0	10.3	4.5	0.0	1.7	0.7
Cabell	24.5	54.5	22.2	.3	11.8	2.5
Calhoun	27.5	49.5	24.4	.2	11.2	4.4
Doddridge	27.4	58.5	26.8	.3	13.9	3.8
Gilmer	30.8	66.1	28.7	.4	14.8	4.4
Hancock	6.7	11.5	6.2	.0	2.1	1.1
Jackson	30.9	72.9	26.3	.3	13.5	4.4
Lincoln	43.0	73.4	33.2	.5	17.7	6.1
Marion	26.2	55.2	25.1	.2	10.1	4.2
Marshall	24.6	54.9	24.4	.1	12.1	4.2
Mason	31.0	69.8	28.9	.2	13.4	5.3
Monongalia	23.8	50.3	21.3	.3	10.8	3.6
Ohio	6.8	16.9	7.0	.0	3.1	1.1
Pleasants	10.9	22.0	10.1	.1	5.6	1.9
Putnam	30.2	67.0	27.6	.5	15.8	3.5
Ritchie	37.5	84.1	35.8	.3	18.1	6.3
Roane	32.4	76.4	30.7	.5	15.8	5.2
Tyler	17.6	39.6	15.6	.2	8.3	2.5

CONTINUED

Table 98 — *continued*

County	Chestnut oak	Other oaks	Hickory	Yellow birch	Sugar maple	Red maple
Wayne	43.4	89.5	37.1	.7	20.1	6.2
Wetzel	41.4	84.2	39.5	.5	22.3	6.2
Wirt	20.8	45.0	20.7	.2	9.8	3.5
Wood	26.6	61.4	24.9	.2	11.0	3.9
Total	569.0	1,213.0	521.0	6.0	263.0	85.0

County	Beech	Basswood	Yellow-poplar	Ash, walnut, cherry	Other hardwoods	Total hardwoods
Brooke	2.8	0.8	3.7	3.4	5.0	52.9
Cabell	18.5	3.8	19.1	15.6	27.9	276.6
Calhoun	17.8	4.3	22.3	18.5	27.5	296.6
Doddridge	24.3	5.1	20.9	18.1	29.7	319.4
Gilmer	22.8	4.8	26.0	20.9	34.8	352.2
Hancock	5.0	1.1	4.7	4.2	6.2	70.6
Jackson	19.9	4.0	22.4	19.9	32.4	338.9
Lincoln	33.5	6.0	34.9	27.5	48.6	452.0
Marion	13.2	4.1	20.5	18.1	25.6	287.5
Marshall	25.9	5.3	18.4	17.7	28.8	296.1
Mason	18.5	5.1	24.7	23.5	32.0	350.6
Monongalia	21.1	3.6	19.7	17.0	29.1	273.3
Ohio	5.8	1.3	5.1	5.3	8.1	81.9
Pleasants	9.4	2.0	9.4	8.5	13.1	128.3
Putnam	28.9	5.0	26.4	20.7	39.9	360.9
Ritchie	25.4	6.7	31.0	29.1	40.8	434.3
Roane	23.2	5.1	27.7	23.3	35.4	380.2
Tyler	14.7	2.7	14.2	11.9	21.2	201.9
Wayne	35.9	6.1	38.6	29.4	54.8	494.6
Wetzel	44.3	10.0	31.2	29.1	47.3	494.5
Wirt	13.1	4.0	17.3	15.5	21.8	240.7
Wood	16.0	4.1	20.8	17.8	28.0	298.0
Total	440.0	95.0	459.0	395.0	638.0	6,482.0

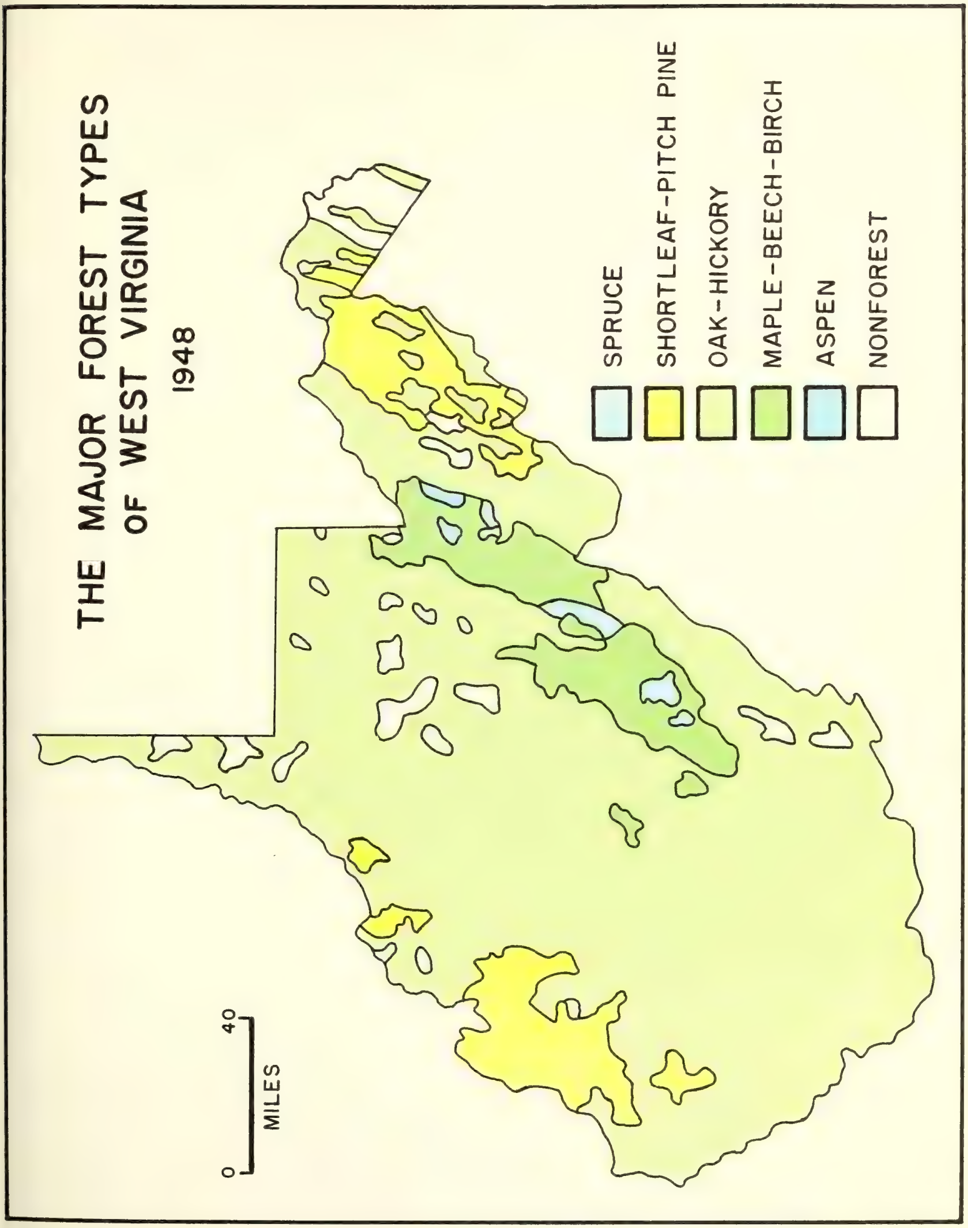

Figure 17.—The major forest cover types in West Virginia.

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PULPWOOD PRODUCTION
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1963

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U.S. FOREST SERVICE RESOURCE BULLETIN NE-3
1966
NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
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PULPWOOD PRODUCTION

in the Northeast

1963

Annual Survey Begun

BECAUSE THE woodpulp industry is one of the mainstays of the forest economy of the Northeastern States, the U. S. Forest Service's Northeastern Forest Experiment Station has begun an annual survey of pulpwood production in the region. This is a report on the survey completed in 1963. The main purposes of these surveys are:

- To determine the current magnitude of the pulpwood market. The survey will help pulpwood producers and pulpmill wood-procurement staffs to identify areas that are capable of producing large volumes of pulpwood.
- To provide year-by-year data that can be used in analyzing trends so that the future of the pulpwood industry can be predicted with reasonable accuracy. This information should not only serve the pulpwood industry in making decisions about

investment of capital and mill development; it should also be useful to public agencies concerned with the management of timber resources because it will provide the basis for projections of future demand and the basis for management decisions.

- To provide data that can be used in evaluating the effects of the pulpwood harvest on the forest resource. This should help industry, landowners, and public agencies in carrying out orderly management of the timber resource to provide for timber supplies to fill future demands.

The Woodpulp Industry

Few industries are more vital to the forest economy than the woodpulp industry. Nationwide, the industry uses about one-fourth of all roundwood timber volume produced.

Seventy-four percent of the Nation's paper and paperboard production in 1962 was manufactured from woodpulp, and the trend is definitely upward. In 1962 the United States produced 2.6 billion cubic feet of round pulpwood; and 12 percent of this total, or 314 million cubic feet, was produced in the 12 Northeastern States — Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and West Virginia.

Seventy-four woodpulp mills were in operation in the Northeast in 1962. The total capacity of these mills at that time was approximately 11,340 tons of woodpulp per day. Maine was the largest woodpulp producer. In 1962 that state's 22 mills had an estimated daily capacity of 5,891 tons. New York was second with 28 mills, which had a total capacity of 2,026 tons per day. Pennsylvania held third place, with a capacity of some 1,705 tons per day in 12 mills.

Woodpulp is manufactured by several different methods in the Northeast. About half is manufactured by the groundwood or chemi-groundwood processes,[1] and more than one-fourth by the

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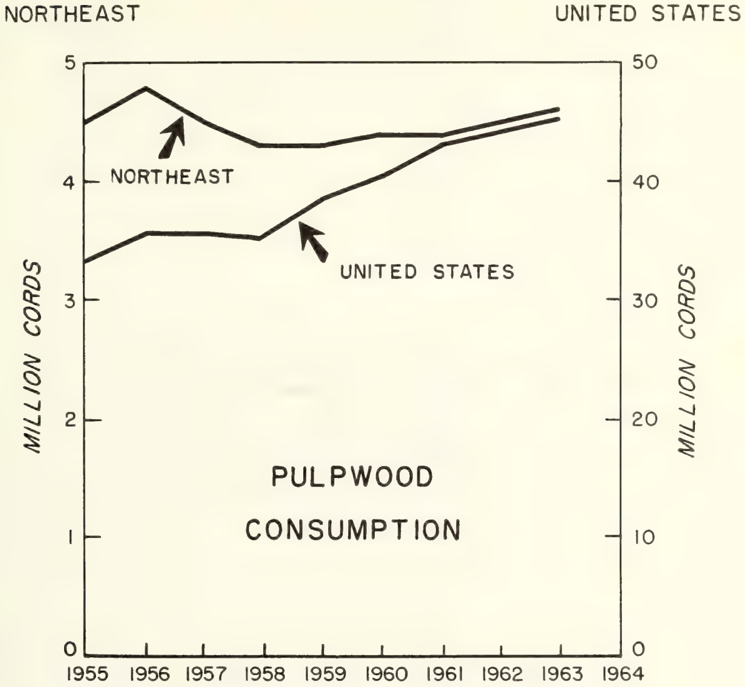
[1] U. S. Forest Service. WOODPULP MILLS IN THE UNITED STATES. 22 pp., illus., 1961.

Figure 1.—The trend of pulpwood consumption in the Northeast has not accelerated as fast as that for the United States as a whole until about 1961.



sulfite process. The remainder is produced by the sulfate, soda, or semichemical processes.

The pulp-and-paper industry in the Northeast has increased, but its rate of growth has tended to lag behind the industry's national rate of growth (fig. 1).

Data Collection

The data for this annual pulpwood production survey were gathered by means of mail questionnaires. Questionnaires were sent to most woodpulp mills in the 12-state study area and to some mills in neighboring states and Canada. In Maine, only those mills thought to be consuming some wood from Canada were canvassed. The Maine Forest Service supplied the estimates of domestic pulpwood production in Maine, and the Vermont Department of Forests and Parks supplied similar information for Vermont. Questionnaires were sent to 56 mills, and all mills responded.

The questionnaires were used also to collect information about the production of wood chips for use in woodpulp manufacture, and about the use of wood-industry byproducts in woodpulp manufacture. Because of the nature of these two classes of material, it was necessary to limit the species breakdown to hardwoods and softwoods, and it was impossible, as well as meaningless, to give location of production by county.

Pulpwood Production

In 1963 the 12 Northeastern States produced 3,990,600 cords of round pulpwood, 316,200 cords of wood chips for pulpwood (produced primarily from sawmill slabs and edgings), and 3,100 cords of pulpwood from miscellaneous wood-industry byproducts. In all, the Northeast produced the equivalent of 4,309,900 cords of pulpwood.

After a general industry-wide slump in 1958, pulpwood consumption began to rise again. However, both consumption and receipts had failed, as of December 1963, to reach the previous high levels attained in 1956.

Consumption of hardwood pulpwood rose steadily from 1955 to 1963 for a total increase of 35 percent in 8 years (fig. 2). The gradual employment of improved methods, which use greater quantities of hardwoods, has had the effect of broadening the resource base. A large volume of hardwood in the resource base has become an opportunity rather than a hindrance to the development of the woodpulp industry.

One group of tables that follow shows the production of pulpwood, by states, counties, and species group, for each of the 12 Northeastern States. Table 18 shows round pulpwood by state, and the amount of this production consumed in and out of the state. Two tables show production, consumption, and interregional shipment of wood chips and miscellaneous wood-industry byproducts used in manufacturing woodpulp.

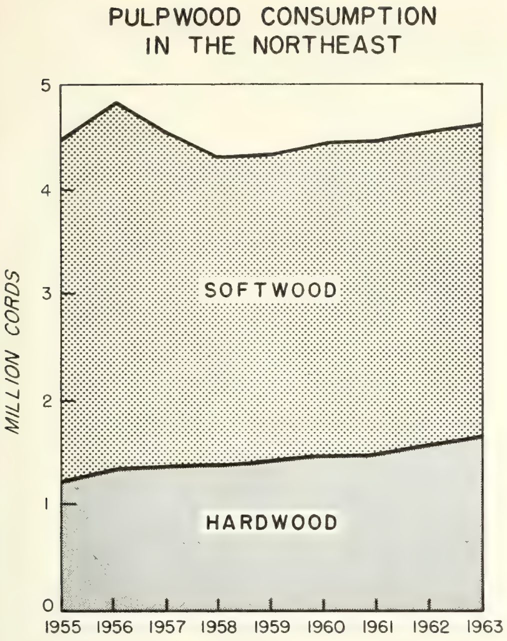


Figure 2. — Total pulpwood consumption dropped to a low point in 1958, but hardwood pulpwood consumption increased steadily from 1955 to 1963.

Of the 12 Northeastern States, Maine led in the production of round pulpwood with 2,150,600 cords (table 2), or 54 percent of the 3,990,600 cords produced in the Northeast. Pennsylvania was second with 511,800 cords, which was 13 percent of the total. New York placed third with 417,000 cords (10 percent of the total); and West Virginia, with no pulping capacity of its own, placed fourth with 300,200 cords, which was 7 percent of the total. These four states together supplied 85 percent of the total production. The remaining eight States, ranked in order of highest production, were: New Hampshire, Vermont, Maryland, New Jersey, Delaware, Massachusetts, Connecticut, and Rhode Island.

Throughout the Northeast, softwoods accounted for 59 percent of the round pulpwood that was produced. However, the proportion of hardwood in the round pulpwood production was higher in the southern section of the region than in the northern section. In Maine, hardwoods accounted for only 25 percent of the total round pulpwood output, whereas in Pennsylvania they accounted for nearly 78 percent.

Spruce and fir accounted for 42 percent of all round pulpwood

Table 1. — Pulpwood received and consumed by woodpulp mills in the Northeast, by years, 1955 to 1963

(In thousands of rough cords[1])

Year and species group		Receipts			Consumption
		Domestic	Imported	Total	
1955	Softwood	2,497.6	791.0	3,288.6	3,268.0
	Hardwood	1,103.2	135.2	1,238.4	1,222.6
	Total	3,600.8	926.2	4,527.0	4,490.6
1956	Softwood	2,787.4	900.1	3,687.5	3,496.9
	Hardwood	1,220.7	143.0	1,363.7	1,339.0
	Total	4,008.1	1,043.1	5,051.2	4,835.9
1957	Softwood	2,566.2	705.4	3,271.6	3,167.8
	Hardwood	1,231.6	196.4	1,428.0	1,362.3
	Total	3,797.8	901.8	4,699.6	4,530.1
1958	Softwood	2,208.6	535.7	2,744.3	2,936.1
	Hardwood	1,103.1	90.0	1,193.1	1,364.2
	Total	3,311.7	625.7	3,937.4	4,300.3
1959	Softwood	2,093.4	466.7	2,560.1	2,901.5
	Hardwood	1,292.5	130.8	1,423.3	1,409.5
	Total	3,385.9	597.5	3,983.4	4,311.0
1960	Softwood	2,657.0	434.6	3,091.6	2,988.3
	Hardwood[2]	1,383.2	140.0	1,523.2	1,446.5
	Total	4,040.2	574.6	4,614.8	4,434.8
1961	Softwood	2,433.8	398.0	2,831.8	2,951.8
	Hardwood[2]	1,313.7	133.0	1,446.7	1,489.2
	Total	3,747.5	531.0	4,278.5	4,441.0
1962	Softwood	2,468.8	386.4	2,855.2	2,938.4
	Hardwood	1,441.1	115.0	1,556.1	1,591.6
	Total	3,909.9	501.4	4,411.3	4,530.0
1963	Softwood	2,604.8	335.9	2,940.7	2,963.5
	Hardwood	1,464.7	99.9	1,564.6	1,648.8
	Total	4,069.5	435.8	4,505.3	4,612.3

Source: U. S. Bureau of the Census. FACTS FOR INDUSTRY, SERIES M14A; and CURRENT INDUSTRIAL REPORTS, SERIES M26A. The Northeast data are for woodpulp mills in nine States. Delaware and West Virginia have no woodpulp mills, and data for mills in Maryland were withheld to avoid disclosing figures for individual companies.

[1] Standard cords of 128 cubic feet of wood, bark, and airspace.

[2] Approximate distribution of total hardwood receipts between domestic and imported was obtained by using the 1959 percentage distribution.

Table 2. — Round pulpwood production in the Northeast, by state and species group, 1963

(In thousands of rough cords)

State	Softwood				Hardwood			All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	
Connecticut	—	—	7.9	7.9	—	7.9	7.9	15.8
Delaware	—	—	26.3	26.3	—	.1	.1	26.4
Maine	1,392.9	169.7	55.0	1,617.6	34.0	499.0	533.0	2,150.6
Maryland	—	—	72.4	72.4	—	65.5	65.5	137.9
Massachusetts	—	—	9.7	9.7	—	16.0	16.0	25.7
New Hampshire	73.7	6.6	3.5	83.8	2.2	94.3	96.5	180.3
New Jersey	—	—	46.1	46.1	—	15.4	15.4	61.5
New York	91.3	11.6	54.2	157.1	18.2	241.7	259.9	417.0
Pennsylvania	—	14.7	98.7	113.4	.3	398.1	398.4	511.8
Rhode Island	—	—	3.2	3.2	—	4.7	4.7	7.9
Vermont	104.9	3.2	2.4	110.5	2.9	42.1	45.0	155.5
West Virginia	—	—	99.8	99.8	—	200.4	200.4	300.2
Total	1,662.8	205.8	479.2	2,347.8	57.6	1,585.2	1,642.8	3,990.6

Table 3. — Pulpwood chip production in the Northeast, by state and destination and by softwood and hardwood, 1963[1]

(In thousands of cords)

State[2]	Total production			Consumed within state			Consumed in other states			
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	
Maine	110.1	8.0	118.1	97.3	8.0	105.3	12.8	—	12.8	(N. H.)
Maryland	35.7	9.9	45.6	—	—	—	3.3	—	3.3	(N. J.)
							32.4	9.9	42.3	(Pa.)
Massachusetts	.1	5.6	5.7	—	—	—	.1	5.6	5.7	(N. Y.)
New Hampshire	34.1	7.6	41.7	25.5	7.0	32.5	8.5	.5	9.0	(Maine)
							.1	.1	.2	(N. Y.)
New York	6.4	19.8	26.2	6.4	15.2	21.6	—	4.6	4.6	(N. J.)
Pennsylvania	3.8	18.8	22.6	3.8	18.8	22.6	—	—	—	
Vermont	7.1	10.6	17.7	—	—	—	1.6	—	1.6	(N. H.)
							5.5	10.6	16.1	(N. Y.)
West Virginia	—	38.6	38.6	—	—	—	—	38.6	38.6	(Ohio)
Virginia	—	—	—	—	—	—	7.7	—	7.7	(Pa.)
Quebec	—	—	—	—	—	—	.2	—	.2	(N. H.)
Total	197.3	118.9	316.2	133.0	49.0	182.0	72.2	69.9	142.1	

[1] The data presented in this table are for pulpwood chips produced, by State. They do not represent the source of raw material for chipping plants (sawmill slabs and edgings); nor do they include wood chips not used in the manufacture of woodpulp.

[2] States with no production are omitted.

Table 4. — Miscellaneous wood-industry byproducts used in woodpulp manufacture, by state and destination and by softwood and hardwood, 1963

(In thousands of cords)

State[1]	Total production			Consumed within state			Consumed in other states			
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total	
New Jersey	2.0	0.4	2.4	2.0	0.4	2.4	—	—	—	
New York	—	.1	.1	—	.1	.1	—	—	—	
Vermont	—	.6	.6	—	—	—	—	0.6	0.6	(N. Y.)
Total	2.0	1.1	3.1	2.0	0.5	2.5	—	0.6	0.6	

[1] States with no production are omitted.

produced in 1963. This fact is somewhat misleading because only four states in the region produced spruce and fir pulpwood, and Maine alone produced 84 percent of this volume (table 2). Spruce and fir accounted for nearly 65 percent of Maine's total round pulpwood production.

In addition to the nearly 4 million cords of round pulpwood produced, the equivalent of 316,200 cords were produced in 1963 in the form of wood chips (table 3). Approximately two-thirds of the wood-chip production was consumed within the state where it was produced. Pennsylvania and New Hampshire were the only states that received wood chips from outside the region: Pennsylvania received 7,700 cords of chips from Virginia and New Hampshire received 200 cords from Quebec.

Wood-industry byproducts were also used in the manufacture of woodpulp. All of this production (3,100 cords) came from three states: New York, New Jersey, and Vermont (table 4).

Round pulpwood production for each State, by county and species group, is shown in tables 6 through 17. These tables are summarized in figure 3, which shows the location and production class of counties in the 12 Northeastern States. Table 18 shows the round pulpwood production for each state, and the consumption in and outside the state.

Inter-Regional Shipments

Of the total round pulpwood production of 3,990,600 cords, 19 percent (767,400 cords) was consumed outside the state in which the pulpwood was cut. 158,000 cords were shipped out of the region. Of this volume Virginia received 109,800 cords, Ontario 31,300 cords, and Quebec 16,900 cords.

The Northeast in 1963 imported 393,100 cords of round pulpwood from outside the area — from Kentucky, Ohio, and Virginia, and from New Brunswick, Nova Scotia, Ontario, and Quebec (table 5). The Canadian portion (339,600 cords) made up 86 percent of the import total. This import total shows a trend away from the use of imported pulpwood (table 1).

Table 5. — Roundwood imported from outside the Northeast, 1963

(In thousands of rough cords)

Source of production and species group	Destination					Total imported
	Maryland	Maine	New Hampshire	Pennsylvania	New York	
Kentucky:						
Softwood	2.5	—	—	—	—	2.5
Hardwood	—	—	—	—	—	—
Total	2.5	—	—	—	—	2.5
Ohio:						
Softwood	1.7	—	—	—	—	1.7
Hardwood	(*)	—	—	1.3	—	1.3
Total	1.7	—	—	1.3	—	3.0
Virginia:						
Softwood	—	—	—	47.4	—	47.4
Hardwood	—	—	—	.6	—	.6
Total	—	—	—	48.0	—	48.0
New Brunswick:						
Softwood	—	161.5	—	—	—	161.5
Hardwood	—	7.0	—	—	—	7.0
Total	—	168.5	—	—	—	168.5
Nova Scotia:						
Softwood	—	7.7	—	—	—	7.7
Hardwood	—	—	—	—	—	—
Total	—	7.7	—	—	—	7.7
Ontario:						
Softwood	—	—	—	34.8	6.5	41.3
Hardwood	—	—	—	21.1	—	21.1
Total	—	—	—	55.9	6.5	62.4
Quebec:						
Softwood	—	—	22.6	.1	47.3	70.0
Hardwood	—	.8	21.8	—	8.4	31.0
Total	—	.8	44.4	.1	55.7	101.0
Grand total	4.2	177.0	44.4	105.3	62.2	393.1

* Less than 50 cords.

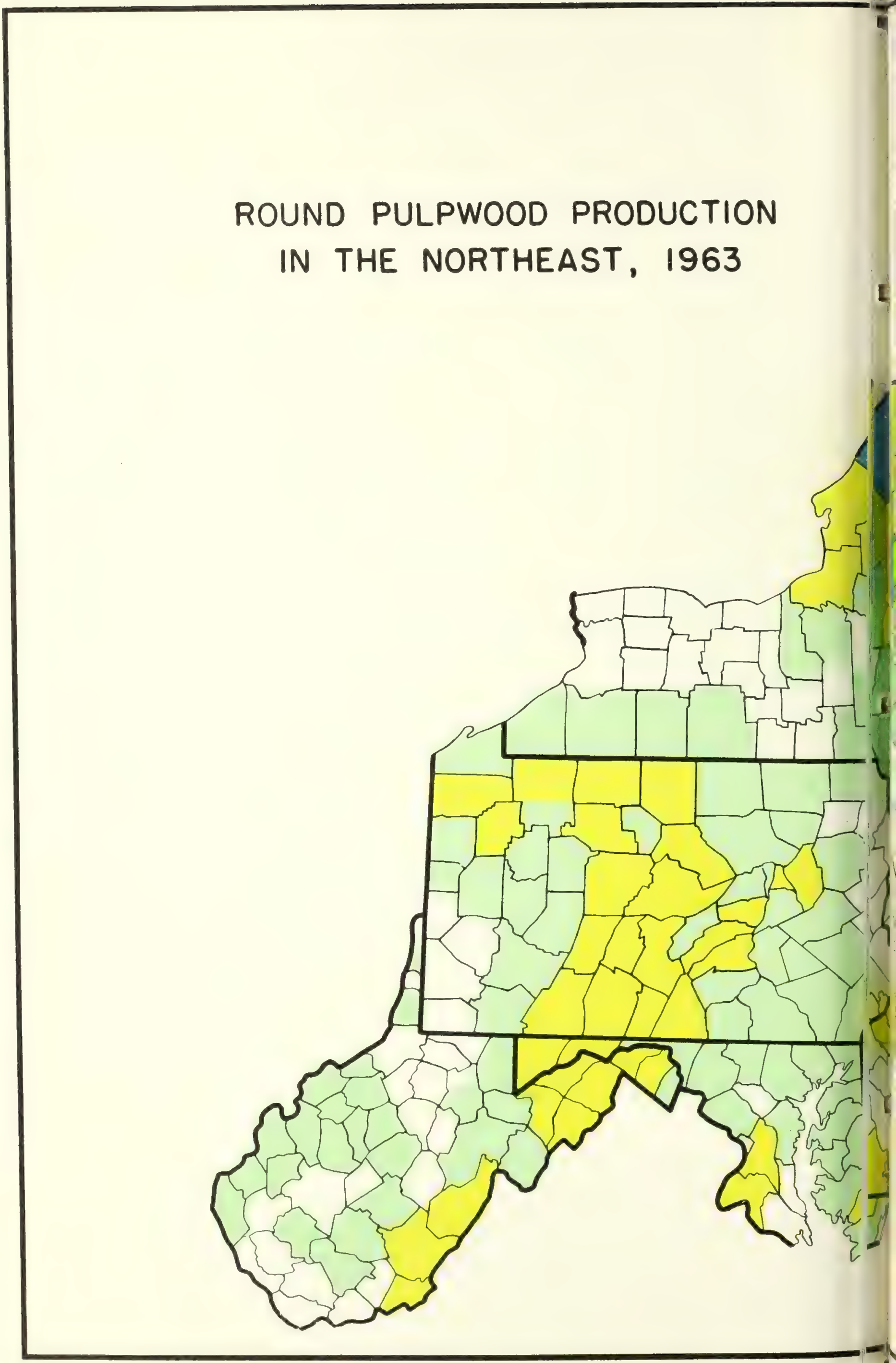
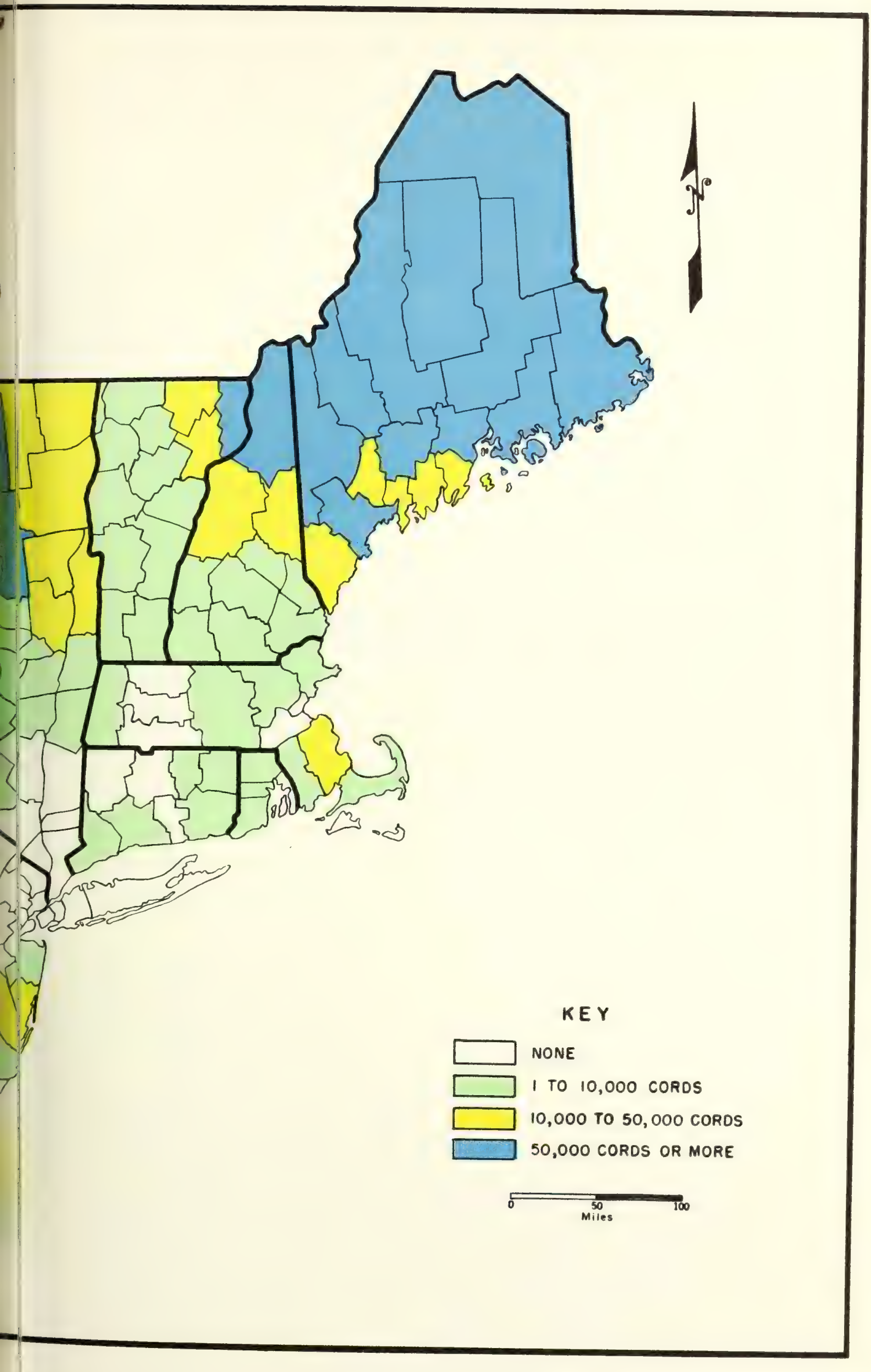


Figure 3. — The pattern of round pulpwood production in the Northeast in 1963.


N
KEY
NONE
1 TO 10,000 CORDS
10,000 TO 50,000 CORDS
50,000 CORDS OR MORE
0
50
100
Miles

Combining the 3,732,600 cords of round pulpwood produced in and intended for consumption within the region with the 393,100 cords imported from outside the region gives a total net receipt of round pulpwood in the region of 4,125,700 cords in 1963.

Of the total 316,000 cords of wood chips produced in the region, only 38,600 cords of hardwood chips were shipped out; this volume went to Ohio. A total of 8,100 cords were received from outside the region. All the miscellaneous byproducts (3,100) were consumed in the region. This gives a total of 285,700 cords of pulpwood chips and byproducts received by mills in the region in 1963.

Combining 4,125,700 cords of round pulpwood and 285,700 cords of chips and byproducts gives a total net receipt of all pulpwood by mills in the region of 4,411,400 cords in 1963.

Buying Practices

Units of measure. — The largest portion of round pulpwood in the Northeast is purchased in cords of 128 cubic feet, made up of bolts 48 inches long. However, in the southern portion of the area substantial quantities are purchased in 160-cubic-foot cords, in bolts 60 inches long. The 160-cubic-foot cord is occasionally referred to as a "unit" to distinguish it from the standard 128-cubic-foot cord. A few mills reported buying wood on a weight basis, but this has not yet become a widespread practice.

Wood chips are usually measured by dry weight, although some mills reported buying chips by the cord. Wood-industry byproducts are usually reported on a weight basis, although a volume basis may sometimes be used.

Procurement area. — Most woodpulp mills try to procure wood as close to the mill as possible — usually within a 50-mile radius. However, some mills obtain wood at greater distances from their mill location. This is usually true if a mill needs a particular species or group of species to fill out its pulpwood requirement and the species is not readily available within the usual procurement area. Wood chips may be procured much further away than roundwood. Because most chipping plants are located at rail sidings, the chips are often shipped by rail in hopper cars.

Debarking

For the Northeast as a whole, 15 percent of the total round pulpwood was debarked before shipment to the mill. And of the total pulpwood production, Delaware debarked 22 percent of its wood, Vermont 21 percent, and Maine and New Hampshire about 18 percent each. In Maine alone, about 387,000 rough cords of round pulpwood were debarked before reaching the woodpulp mill yards.

Among the species groups, 85 percent of the aspen and yellow-poplar was debarked, 64 percent of the hemlock and tamarack, and 15 percent of the spruce and fir. Only 7 percent of the pine and 9 percent of the other hardwoods was debarked. However, the volume of spruce and fir that had been debarked was greater than for any other species group — about 248,000 rough cords.

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Table 6. — Round pulpwood production in Connecticut, by county and species group, 1963

(In thousands of rough cords)

County	Softwood				Hardwood			All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	
Fairfield	—	—	1.4	1.4	—	—	—	1.4
Hartford	—	—	—	—	—	—	—	—
Litchfield	—	—	—	—	—	—	—	—
Middlesex	—	—	—	—	—	—	—	—
New Haven	—	—	3.8	3.8	—	—	—	3.8
New London	—	—	.4	.4	—	1.1	1.1	1.5
Tolland	—	—	.3	.3	—	.2	.2	.5
Windham	—	—	2.0	2.0	—	6.6	6.6	8.6
Total	—	—	7.9	7.9	—	7.9	7.9	15.8

Table 7. — Round pulpwood production in Delaware, by county and species group, 1963

(In thousands of rough cords)

County	Softwood				Hardwood			All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	
Kent	—	—	—	—	—	—	—	—
Newcastle	—	—	—	—	—	—	—	—
Sussex	—	—	26.3	26.3	—	0.1	0.1	26.4
Total	—	—	26.3	26.3	—	0.1	0.1	26.4

Table 8. — Round pulpwood production in Maine, by county and species group, 1963

(In thousands of rough cords)

County	Softwood				Hardwood			All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	
Androscoggin	4.0	3.5	7.0	14.5	0.2	15.1	15.3	29.8
Aroostook	382.9	10.5	—	393.4	19.3	29.9	49.2	442.6
Cumberland	5.4	2.0	12.4	19.8	(*)	34.0	34.0	53.8
Franklin	60.6	6.4	(*)	67.0	2.0	39.8	41.8	108.8
Hancock	47.9	8.3	—	56.2	.1	7.9	8.0	64.2
Kennebec	12.2	8.0	6.2	26.4	.5	39.7	40.2	66.6
Knox	6.8	1.4	—	8.2	(*)	3.6	3.6	11.8
Lincoln	18.7	1.6	6.3	26.6	(*)	10.7	10.7	37.3
Oxford	38.3	11.2	9.7	59.2	1.1	95.9	97.0	156.2
Penobscot	150.8	43.9	.1	194.8	5.5	85.1	90.6	285.4
Piscataquis	200.6	12.2	—	212.8	2.8	21.7	24.5	237.3
Sagadahoc	3.6	.8	6.8	11.2	—	3.4	3.4	14.6
Somerset	321.5	12.4	.1	334.0	1.5	54.8	56.3	390.3
Waldo	22.2	2.3	(*)	24.5	.2	33.6	33.8	58.3
Washington	116.9	45.2	—	162.1	.8	8.0	8.8	170.9
York	.5	(*)	6.4	6.9	—	15.8	15.8	22.7
Total	1,392.9	169.7	55.0	1,617.6	34.0	499.0	533.0	2,150.6

* Less than 50 cords.

Table 9. — Roundwood pulpwood production in Maryland, by county and species group, 1963

(In thousands of rough cords)

County	Softwood				Hardwood			All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	
Allegany	—	—	6.2	6.2	—	30.4	30.4	36.6
Ann Arundel	—	—	4.6	4.6	—	—	—	4.6
Baltimore	—	—	(*)	(*)	—	.4	.4	.4
Calvert	—	—	—	—	—	—	—	—
Caroline	—	—	9.1	9.1	—	(*)	(*)	9.1
Carroll	—	—	(*)	(*)	—	(*)	(*)	(*)
Cecil	—	—	.2	.2	—	.3	.3	.5
Charles	—	—	12.5	12.5	—	.2	.2	12.7
Dorchester	—	—	5.9	5.9	—	—	—	5.9
Frederick	—	—	(*)	(*)	—	.7	.7	.7
Garrett	—	—	1.3	1.3	—	32.5	32.5	33.8
Harford	—	—	.2	.2	—	—	—	.2
Howard	—	—	—	—	—	—	—	—
Kent	—	—	.3	.3	—	—	—	.3
Montgomery	—	—	.5	.5	—	—	—	.5
Prince Georges	—	—	10.3	10.3	—	.3	.3	10.6
Queen Annes	—	—	1.4	1.4	—	—	—	1.4
St. Marys	—	—	—	—	—	—	—	—
Somerset	—	—	.4	.4	—	—	—	.4
Talbot	—	—	.9	.9	—	—	—	.9
Washington	—	—	.4	.4	—	.7	.7	1.1
Wicomico	—	—	14.9	14.9	—	—	—	14.9
Worcester	—	—	3.4	3.4	—	—	—	3.4
Total	—	—	72.5	72.5	—	65.5	65.5	138.0

* Less than 50 cords.

Table 10. — Round pulpwood production in Massachusetts, by county and species group, 1963

(In thousands of rough cords)

County[1]	Softwood				Hardwood			All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	
Barnstable	—	—	0.2	0.2	—	0.1	0.1	0.3
Berkshire	—	—	—	—	—	3.1	3.1	3.1
Bristol	—	—	2.4	2.4	—	2.2	2.2	4.6
Essex	—	—	—	—	—	1.4	1.4	1.4
Middlesex	—	—	—	—	—	.2	.2	.2
Plymouth	—	—	7.1	7.1	—	7.3	7.3	14.4
Worcester	—	—	—	—	—	1.7	1.7	1.7
Total	—	—	9.7	9.7	—	16.0	16.0	25.7

[1] Counties with no production are omitted.

Table 11. — Round pulpwood production in New Hampshire, by county and species group, 1963

(In thousands of rough cords)

County	Softwood				Hardwood			All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	
Belknap	—	—	—	—	—	0.1	0.1	0.1
Carroll	0.8	(*)	0.4	1.2	(*)	12.5	12.5	13.7
Cheshire	(*)	(*)	(*)	(*)	—	.9	.9	.9
Coos	66.2	5.8	2.6	74.6	2.1	64.0	66.1	140.7
Grafton	6.6	.8	.4	7.8	.1	6.6	6.7	14.5
Hillsborough	(*)	(*)	(*)	(*)	—	1.8	1.8	1.8
Merrimack	—	—	—	—	—	2.2	2.2	2.2
Rockingham	—	—	—	—	—	2.4	2.4	2.4
Strafford	—	—	—	—	—	2.3	2.3	2.3
Sullivan	—	—	—	—	—	1.4	1.4	1.4
Total	73.6	6.6	3.4	83.6	2.2	94.2	96.4	180.0

* Less than 50 cords.

Table 12.—Round pulpwood production in New Jersey, by county and species group, 1963

(In thousands of rough cords)

County[1]	Softwood: Spruce and fir	Softwood: Hemlock and tamarack	Softwood: Pine	Softwood: Total	Hardwood: Aspen and yellow-poplar	Hardwood: Other hard-woods	Hardwood: Total	All species
Atlantic	—	—	2.2	2.2	—	—	—	2.2
Burlington	—	—	17.2	17.2	—	3.9	3.9	21.1
Camden	—	—	4.6	4.6	—	7.7	7.7	12.3
Gloucester	—	—	6.4	6.4	—	3.8	3.8	10.2
Monmouth	—	—	1.1	1.1	—	—	—	1.1
Ocean	—	—	14.6	14.6	—	—	—	14.6
Total	—	—	46.1	46.1	—	15.4	15.4	61.5

[1] Counties with no production are omitted.

Table 13. — Roundwood pulpwood production in New York, by county and species group, 1963

(In thousands of rough cords)

County[1]	Softwood				Hardwood			All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hardwoods	Total	
Albany	—	—	—	—	—	0.6	0.6	0.6
Allegany	—	0.1	0.6	0.7	—	1.5	1.5	2.2
Broome	—	—	—	—	—	.1	.1	.1
Cattaraugus	—	.2	.6	.8	—	5.9	5.9	6.7
Cayuga	—	—	—	—	0.6	.6	1.2	1.2
Chautauqua	—	(*)	.2	.2	—	1.6	1.6	1.8
Chenango	—	—	—	—	—	.2	.2	.2
Clinton	7.9	.8	10.9	19.6	1.6	22.1	23.7	43.3
Columbia	—	—	—	—	—	3.5	3.5	3.5
Delaware	.3	.1	.6	1.0	.1	1.9	2.0	3.0
Essex	5.5	.3	2.6	8.4	1.8	31.1	32.9	41.3
Franklin	13.1	.6	4.2	17.9	1.2	6.8	8.0	25.9
Fulton	2.1	(*)	(*)	2.1	.5	6.4	6.9	9.0
Greene	—	—	—	—	—	.1	.1	.1
Hamilton	32.0	—	.1	32.1	.1	23.4	23.5	55.6
Herkimer	8.6	(*)	(*)	8.6	(*)	3.9	3.9	12.5
Jefferson	—	.4	5.9	6.3	(*)	3.9	3.9	10.2
Lewis	4.0	1.0	7.8	12.8	.4	8.4	8.8	21.6
Montgomery	(*)	—	.3	.3	—	1.7	1.7	2.0
Oneida	1.1	.2	1.5	2.8	(*)	4.1	4.1	6.9
Onondaga	—	—	—	—	—	(*)	(*)	(*)
Oswego	(*)	.4	3.7	4.1	2.3	9.2	11.5	15.6
Otsego	.1	—	—	.1	—	—	—	.1
Rensselaer	.3	—	—	.3	.2	7.5	7.7	8.0
St. Lawrence	12.7	3.5	15.0	31.2	5.3	14.1	19.4	50.6
Saratoga	.9	3.8	(*)	4.7	1.0	19.2	20.2	24.9
Schenectady	—	—	—	—	—	.2	.2	.2
Schoharie	(*)	—	(*)	(*)	—	2.6	2.6	2.6
Steuben	—	(*)	(*)	(*)	—	—	—	(*)
Sullivan	—	(*)	—	(*)	—	—	—	(*)
Warren	2.4	.1	.1	2.6	2.4	38.5	40.9	43.5
Washington	.3	.1	.1	.5	.7	22.6	23.3	23.8
Total	91.3	11.6	54.2	157.1	18.2	241.7	259.9	417.0

* Less than 50 cords.

[1] Counties with no production are omitted.

Table 14. — Round pulpwood production in Pennsylvania, by county and species group, 1963

(In thousands of rough cords)

County¹	Softwood: Spruce and fir	Softwood: Hemlock and tamarack	Softwood: Pine	Softwood: Total	Hardwood: Aspen and yellow-poplar	Hardwood: Other hard-woods	Hardwood: Total	All species
Adams	—	—	0.2	0.2	—	3.8	3.8	4.0
Armstrong	—	—	—	—	—	.1	.1	.1
Bedford	—	—	13.7	13.7	—	36.0	36.0	49.7
Berks	—	—	4.0	4.0	—	(*)	(*)	4.0
Blair	—	1.1	1.3	2.4	—	16.6	16.6	19.0
Bradford	—	(*)	(*)	(*)	—	—	—	(*)
Butler	—	—	—	—	—	.3	.3	.3
Cambria	—	1.6	(*)	1.6	—	12.8	12.8	14.4
Cameron	—	(*)	3.6	3.6	—	.8	.8	4.4
Centre	—	3.0	6.9	9.9	—	21.5	21.5	31.4
Chester	—	—	—	—	—	.1	.1	.1
Clarion	—	(*)	.2	.2	(*)	3.3	3.3	3.5
Clearfield	—	4.6	4.0	8.6	(*)	24.8	24.8	33.4
Clinton	—	1.0	3.0	4.0	(*)	8.7	8.7	12.7
Columbia	—	—	2.1	2.1	—	9.6	9.6	11.7
Crawford	—	.1	—	.1	—	15.2	15.2	15.3
Cumberland	—	—	.5	.5	—	6.3	6.3	6.8
Dauphin	—	—	.1	.1	—	.3	.3	.4
Elk	—	1.0	1.8	2.8	—	23.2	23.2	26.0
Erie	—	—	(*)	(*)	—	4.5	4.5	4.5
Fayette	—	—	—	—	—	3.9	3.9	3.9
Forest	—	(*)	.4	.4	—	4.8	4.8	5.2
Franklin	—	—	4.9	4.9	—	17.8	17.8	22.7
Fulton	—	—	9.5	9.5	—	15.8	15.8	25.3
Huntingdon	—	—	12.7	12.6	—	24.3	24.3	36.9
Indiana	—	—	—	—	—	.8	.8	.8
Jefferson	—	.2	.1	.3	0.2	6.2	6.4	6.7
Juniata	—	—	6.1	6.1	—	8.0	8.0	14.1
Lancaster	—	—	(*)	(*)	—	2.0	2.0	2.0
Lawrence	—	—	—	—	—	.1	.1	.1
Lebanon	—	—	(*)	(*)	—	—	—	(*)
Luzerne	—	(*)	.8	.8	—	2.8	2.8	3.6
Lycoming	—	.2	.7	.9	—	4.0	4.0	4.9
McKean	—	1.6	1.0	2.6	—	26.8	26.8	29.4

CONTINUED

TABLE 14 — CONTINUED

(In thousands of rough cords)

County[1]	Softwood				Hardwood			
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	All species
Mercer	—	—	—	—	—	1.1	1.1	1.1
Mifflin	—	—	(*)	(*)	—	—	—	(*)
Montour	—	(*)	2.1	2.1	—	9.6	9.6	11.7
Northumberland	—	—	.6	.6	—	2.8	2.8	3.4
Perry	—	(*)	3.2	3.2	—	7.1	7.1	10.3
Potter	—	.3	.1	.4	—	3.9	3.9	4.3
Schuylkill	—	(*)	1.2	1.2	—	3.8	3.8	5.0
Snyder	—	—	7.9	7.9	—	17.7	17.7	25.6
Somerset	—	—	1.5	1.5	—	11.4	11.4	12.9
Sullivan	—	(*)	.6	.6	—	3.8	3.8	4.4
Susquehanna	—	—	(*)	(*)	—	—	—	(*)
Tioga	—	(*)	.1	.2	—	.4	.4	.6
Union	—	—	.6	.6	—	2.8	2.8	3.4
Venango	—	—	—	—	—	12.1	12.1	12.1
Warren	—	(*)	.1	.1	—	11.5	11.5	11.6
Westmoreland	—	—	(*)	(*)	—	.6	.6	.6
York	—	—	3.1	3.1	—	4.4	4.4	7.5
Total	—	14.7	98.7	113.4	0.2	398.2	398.4	511.8

* Less than 50 cords.

[1] Counties with no production are omitted.

Table 15. — Round pulpwood production in Rhode Island, by county and species group, 1963

(In thousands of rough cords)

County	Softwood				Hardwood			
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	All species
Bristol	—	—	—	—	—	—	—	—
Kent	—	—	0.6	0.6	—	2.7	2.7	3.3
Newport	—	—	—	—	—	—	—	—
Providence	—	—	2.1	2.1	—	.9	.9	3.0
Washington	—	—	.5	.5	—	1.1	1.1	1.6
Total	—	—	3.2	3.2	—	4.7	4.7	7.9

Table 16. — Round pulpwood production in Vermont, by county and species group, 1963

(In thousands of rough cords)

County	Softwood				Hardwood			All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Other hard-woods	Total	
Addison	0.7	(*)	(*)	0.7	0.2	2.7	2.9	3.6
Bennington	(*)	—	—	(*)	(*)	1.8	1.8	1.8
Caledonia	15.9	0.6	0.2	16.7	.2	5.6	5.8	22.5
Chittenden	4.0	(*)	.8	4.8	.3	1.7	2.0	6.8
Essex	30.6	2.0	.4	33.0	.7	16.6	17.3	50.3
Franklin	8.7	—	.3	9.0	(*)	.1	.1	9.1
Grand Isle	(*)	—	—	(*)	(*)	.7	.7	.7
Lamoille	4.2	(*)	.4	4.6	(*)	.2	.2	4.8
Orange	2.9	(*)	(*)	2.9	(*)	.8	.8	3.7
Orleans	13.2	.4	.3	13.9	.1	3.6	3.7	17.6
Rutland	3.9	—	(*)	3.9	.5	3.3	3.8	7.7
Washington	7.1	.2	(*)	7.3	.1	1.2	1.3	8.6
Windham	6.8	—	—	6.8	.4	2.7	3.1	9.9
Windsor	6.9	(*)	(*)	6.9	.4	1.2	1.6	8.5
Total	104.9	3.2	2.4	110.5	2.9	42.2	45.1	155.6

* Less than 50 cords.

Table 17. — Round pulpwood production in West Virginia, by county and species group, 1963

(In thousands of rough cords)

County[1]	Softwood: Spruce and fir	Softwood: Hemlock and tamarack	Softwood: Pine	Softwood: Total	Hardwood: Aspen and yellow-poplar	Hardwood: Other hardwoods	Hardwood: Total	All species
Barbour	—	—	—	—	—	0.1	0.1	0.1
Berkeley	—	—	10.6	10.6	—	1.3	1.3	11.9
Boone	—	—	(*)	(*)	—	.2	.2	.2
Braxton	—	—	—	—	—	.2	.2	.2
Brooke	—	—	—	—	—	(*)	(*)	(*)
Cabell	—	—	.6	.6	—	—	—	.6
Calhoun	—	—	.3	.3	—	(*)	(*)	.3
Fayette	—	—	.1	.1	—	.5	.5	.6
Gilmer	—	—	(*)	(*)	—	.1	.1	.1
Grant	—	—	4.7	4.7	—	21.1	21.1	25.8
Greenbrier	—	—	1.6	1.6	—	28.8	28.8	30.4
Hampshire	—	—	20.4	20.4	—	23.9	23.9	44.3
Hardy	—	—	10.6	10.6	—	14.9	14.9	25.5
Jackson	—	—	1.5	1.5	—	.1	.1	1.6
Jefferson	—	—	—	—	—	.1	.1	.1
Marshall	—	—	—	—	—	(*)	(*)	(*)
Mason	—	—	3.9	3.9	—	.5	.5	4.4
Mineral	—	—	6.6	6.6	—	23.7	23.7	30.3
Monroe	—	—	5.0	5.0	—	39.2	39.2	44.2
Morgan	—	—	14.5	14.5	—	6.9	6.9	21.4
Nicholas	—	—	—	—	—	(*)	(*)	(*)
Pendleton	—	—	2.0	2.0	—	3.8	3.8	5.8
Pleasants	—	—	(*)	(*)	—	(*)	(*)	(*)
Pocahontas	—	—	1.3	1.3	—	12.7	12.7	14.0
Preston	—	—	(*)	(*)	—	3.6	3.6	3.6
Putnam	—	—	1.5	1.5	—	(*)	(*)	1.5
Raleigh	—	—	.1	.1	—	.3	.3	.4
Randolph	—	—	.1	.1	—	3.1	3.1	3.2
Ritche	—	—	1.9	1.9	—	2.7	2.7	4.6
Roane	—	—	2.6	2.6	—	—	—	2.6
Tucker	—	—	.1	.1	—	8.6	8.6	8.7
Wayne	—	—	(*)	(*)	—	—	—	(*)
Wirt	—	—	5.5	5.5	—	2.8	2.8	8.3
Wood	—	—	4.3	4.3	—	1.2	1.2	5.5
Total	—	—	99.8	99.8	—	200.4	200.4	300.2

* Less than 50 cords.

[1] Counties with no production are omitted.

Table 18. — Round pulpwood production in the Northeast, by state and by consumption in-state and out-of-state, 1963

(In thousands of rough cords)

State	Total production	Consumed in-state	Consumed out-of-state
Connecticut	15.8	(d)	(d)
Delaware	26.4	—	26.4
Maine	2,150.6	2,041.7	108.9
Maryland	137.9	(d)	(d)
Massachusetts	25.7	(d)	(d)
New Hampshire	180.3	143.4	36.9
New Jersey	61.5	61.5	—
New York	417.0	380.2	36.8
Pennsylvania	511.8	472.8	39.0
Rhode Island	7.9	(d)	(d)
Vermont	155.5	25.5	130.0
West Virginia	300.2	—	300.2
Total	3,990.6	3,223.2	767.4

"d" Information withheld to avoid disclosing data for individual mills.

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A Look at
BLACK WALNUT
Timber Resources and Industries

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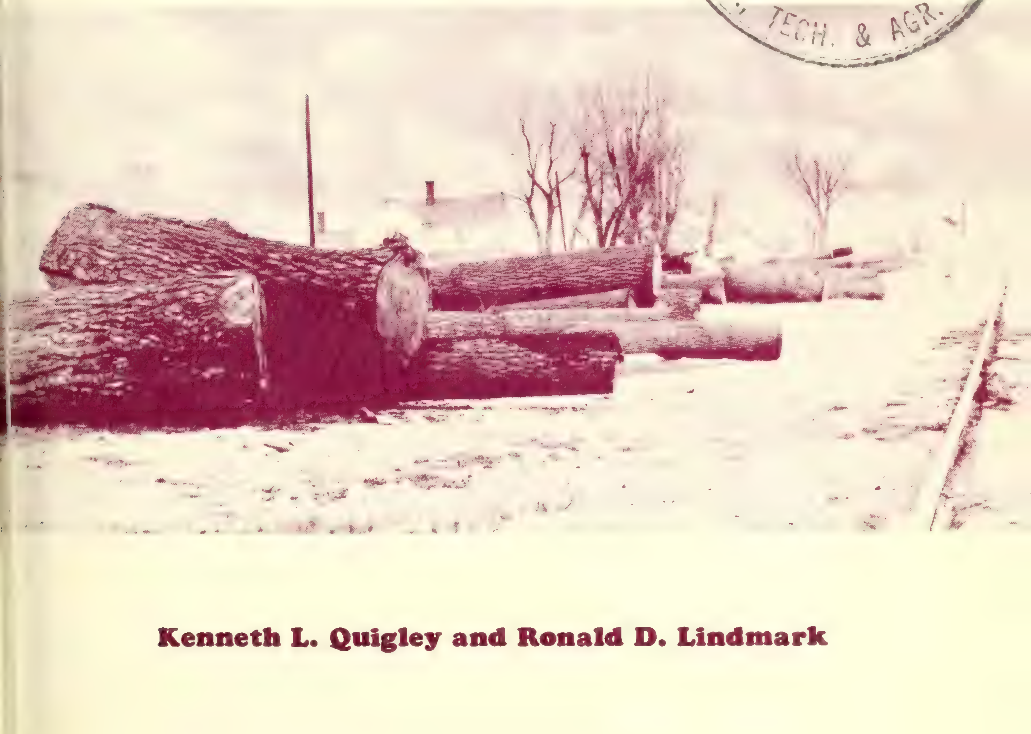

Kenneth L. Quigley and Ronald D. Lindmark

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NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

COVER PHOTO. — These black walnut veneer logs, harvested in Ohio, are destined for export to Italy.

The Authors

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A Look at
BLACK WALNUT
Timber Resources and Industries

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A Top-Rank Tree

OUR BLACK WALNUT tree (*Juglans nigra* L.) has always had top rank among trees in America. It claims its rank on two counts: it is one of our major nut trees; and its wood has a beauty and utility that few other trees can match.

Colonists were quick to make friends of the walnut tree. Its large nuts, collected by the bushel in the fall, provided a tasty and nourishing addition to the table fare. They used its wood to make their beds, tables, chairs, cradles, and dozens of household implements. Many of these works of colonial craftsmanship survive today as cherished antiques and museum pieces, their beauty and usefulness undiminished after more than two centuries of use.

As colonists moved westward from the Seaboard States into the Central States, they found black walnut even more plentiful. Trees were reported up to 6 feet in diameter, and 150 feet tall. The wood was so clear and easy to split, and so durable, that it was used extensively for fence rails. When Abe Lincoln was splitting fence rails, he probably split up many a walnut tree. The wood was used for building cabins, and later for trim in fine homes.

Walnut has always been the preferred wood for gunstocks. Pennsylvania gunsmiths used it for the long rifles that became famous in the wars with the Indians and the British. During the Civil War, and later during World War I and World War II, the demand for walnut for gunstocks was so great that it put a heavy drain on the resource of this timber.

The major use for black walnut today, both at home and abroad, is in furniture manufacture. One main mark of walnut's distinction is that many other fine woods are stained to make them look like walnut.

Walnut wood — ranging from rich dark browns to pleasing lighter browns — can be finished without stain. Under a good finish, the grain gives the wood those ineffable highlights, changing with the light and the angle of view, that few other woods possess.

American black walnut now is in strong demand in both American and foreign markets. The sharply expanding foreign market and the steady domestic market have raised questions as to the adequacy of the present and future supplies of black walnut timber. As a result, numerous measures to increase or sustain the supply have been taken. These include the establishment of a quota on the export of walnut logs and bolts, requests that the domestic veneer industry cut thinner veneers, and expanded research and extension work to encourage walnut culture.

To understand and evaluate the black walnut situation, one must know the extent of the resource and its growth characteristics. This report summarizes our current knowledge of these things and evaluates the present and anticipated use of walnut. The U. S. Forest Service's 1965 report on *Timber trends in the United States,* and forest surveys conducted since 1946 in the central region, where some additional information was collected, provide the basic information for this report. However, because black walnut is a minor species in every state in which it grows, the findings of these surveys are subject to large statistical variation, especially when applied to small areas or small volumes.

The Walnut Resource

Black walnut most frequently occurs as scattered trees in hardwood forest stands. It also occurs in narrow wooded strips along streams, in pastures, and in fence rows.

Black walnut is a fairly fast-growing tree that does best on rich, moist, but well-drained soil. Good agricultural soil is ideal. The tree does not grow well at high elevations or on wet bottomland and is intolerant to shade except in the early years of growth.

Location

Black walnut is found throughout most of the eastern half of the United States (fig. 1). The area of greatest commercial importance, however, is the central region.

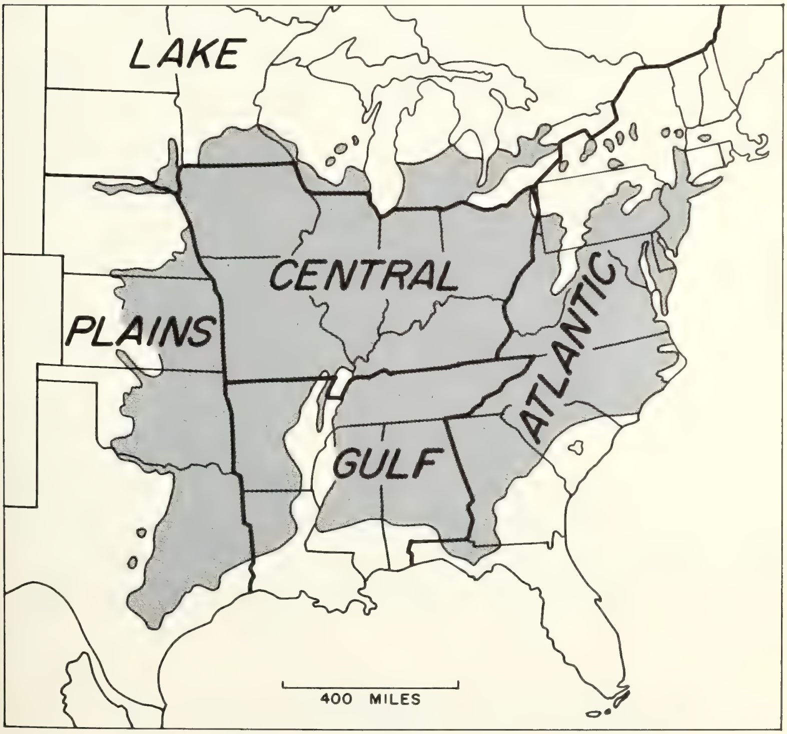


Figure 1.—The range of black walnut, and the geographical regions discussed.

The 1962 appraisal of the timber resources of the United States shows that there is more than 1 billion cubic feet of walnut growing stock (trees 5.0 inches d.b.h. and larger) on commercial forest land. Of this, approximately 62 percent is in sawtimber-size trees. The sawtimber volume is estimated to be 2.7 billion board feet. More than half of this volume is in the central region (table 1).

In addition to the walnut timber on commercial forest land, some walnut is growing in open pastures and narrow forested strips along small streams, windbreaks, and fence rows. These areas, although tree-covered, are not classed a commercial forest

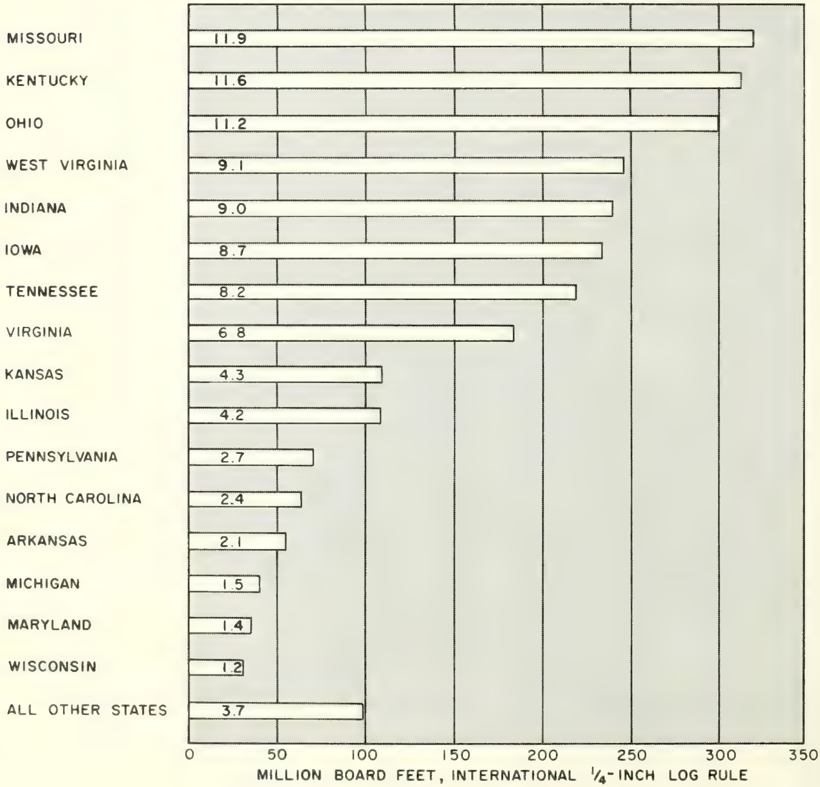
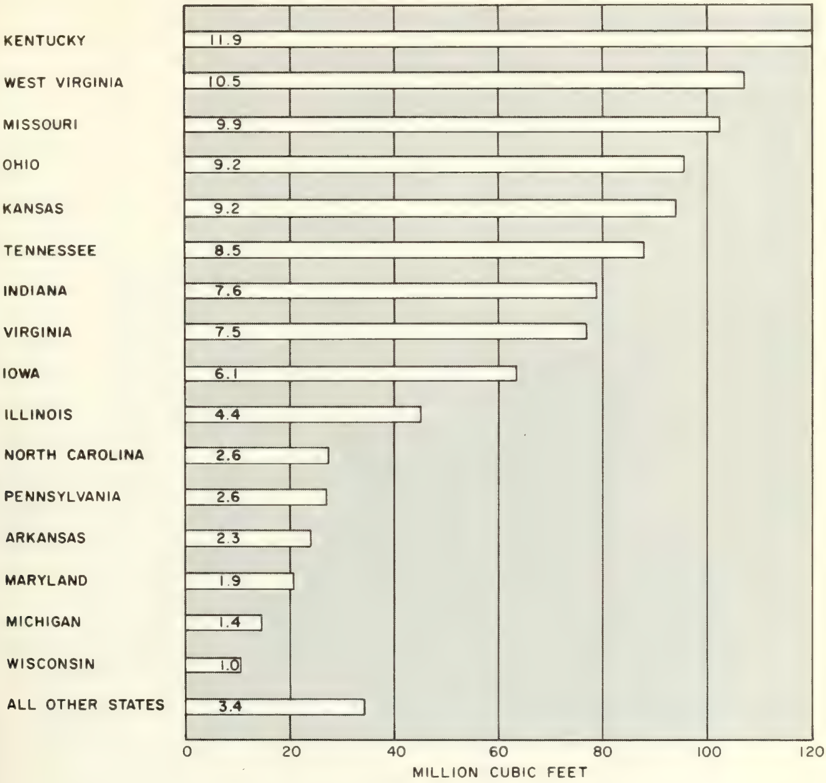


Figure 2. — Net volume of walnut sawtimber, by states, January 1963. The numbers in the bars show percentage distribution. Source: TIMBER TRENDS IN THE UNITED STATES, U. S. Forest Serv. Resource Rep. 17; except for Kansas, which reflects new unpublished information.

Figure 3. — Net volume of walnut growing stock, by states, January 1963. Source: TIMBER TRENDS IN THE UNITED STATES, U. S. Forest Serv. Resource Rep. 17.

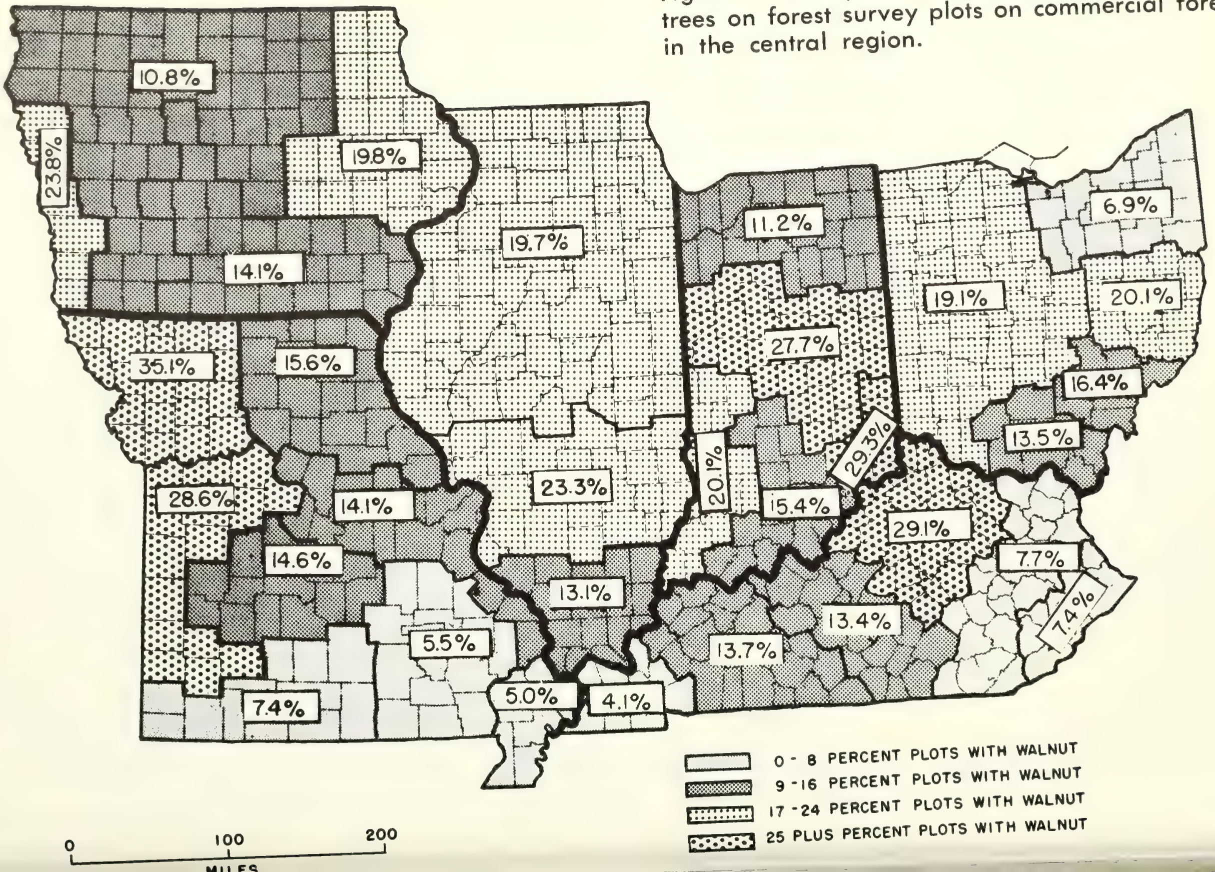


land because of their small size. Therefore standing timber from these sources is not included in the timber-volume estimates reported.

Ten states (the six Central States and four bordering states) each have more than 100 million board feet of sawtimber volume. These states account for 85 percent of both the total walnut growing stock and the sawtimber volume (figs. 2 and 3). Missouri, Kentucky, and Ohio alone have more than 900 million board feet or one-third of the walnut sawtimber volume in the country.

Most black walnut timber is growing on small private tracts. In the 10 states having the greatest volume of black walnut growing stock, 87 percent of the commercial forest land is held by

Figure 4. — Frequency of occurrence of black walnut trees on forest survey plots on commercial forest land in the central region.



small woodland owners. The majority of these are farmers. Forest industry owners hold only 5 percent and various governmental agencies hold the remaining 8 percent.

Even in the states where it is most abundant, black walnut comprises only a small part of the timber volume. In Iowa, black walnut trees account for 3.8 percent of the sawtimber volume. Other states that have black walnut timber making up 1 percent or more of their sawtimber volumes are: Kansas — 2.9 percent, Missouri — 2.5 percent, Indiana — 1.9 percent, Ohio — 1.8 percent, Illinois — 1.3 percent, Tennessee — 1.1 percent, and Kentucky — 1.1 percent.

Some additional information from the surveys of the central region is available about the occurrence of walnut in forest stands. These data also show the scattered nature of the walnut supply. More than 14 percent of the forest plots (about 10,700) surveyed in the central region since 1946 contained black walnut trees 5 inches d.b.h. and larger. Black walnut sawtimber-size trees were tallied on 6½ percent of the plots. Poletimber-size trees were found about twice as frequently as sawtimber trees. On the average, only one or two walnut trees were tallied on plots where they did occur.

The survey also showed that black walnut trees were found much more frequently in some survey units than in others. In northwestern Missouri and the Blue Grass region of Kentucky black walnut trees were found on 30 percent of the plots (fig. 4). But in western Kentucky and adjacent survey units in Missouri, black walnut trees occurred on fewer than 6 percent of the plots.

Quality

No accurate nationwide surveys have been made of the volume of walnut timber that is of veneer quality. However, an estimate of the volume of high-quality walnut can be made by using information from state survey reports.

Surveys conducted in Illinois, Kentucky, and Missouri since 1960 showed that about 10 percent of the walnut sawtimber volume was in trees 19 inches d.b.h. and larger; another 30 percent was in trees between 15 and 19 inches d.b.h. And regionwide surveys revealed that approximately 45 percent of the volume in walnut trees 15 inches d.b.h. and larger is in grade 1 or 2 logs as graded according to the U. S. Forest Products Laboratory Hardwood Log Grades for Standard Lumber (fig. 5). Applying these percentages over the commercial range of walnut, we estimate that the volume of better quality walnut timber (grades 1 and 2) is about 490 million board feet (International ¼-inch rule).

Merchantable length is another indicator of tree quality. More than 55 percent of the sawtimber-size walnut trees have from 16 to 24 feet of merchantable length (fig. 5).

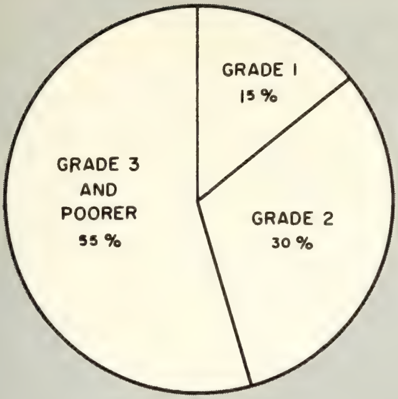
Growth

We estimate annual growth of the sawtimber-size walnut trees in the United States at about 120 million board feet. We believe that the annual increment of better quality timber is accruing at a slightly faster rate than growth on all sawtimber trees because much of the walnut timber is just growing into the size class from which good-quality logs can be obtained (fig. 5). We estimate that the growth rate of the better quality timber is 5 to 7 percent or between 25 and 35 million board feet annually.

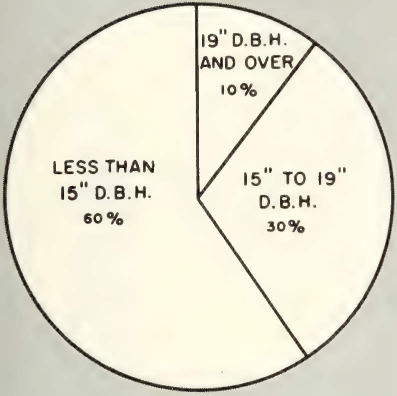
In the central region, diameter-growth measurements of a representative sample of black walnut trees showed that the trees were growing at rates up to 5.9 inches at d.b.h. during the 10 years prior to measurement. Distribution of the sample trees by diameter-growth classes was as follows:

Diameter at breast height growth in 10 years (inches)	*Poletimber (percent)*	*Sawtimber (percent)*
0 to 0.9	14	6
1.0 to 1.9	35	47
2.0 to 2.9	36	37
3.0 to 3.9	14	9
4.0 plus	1	1

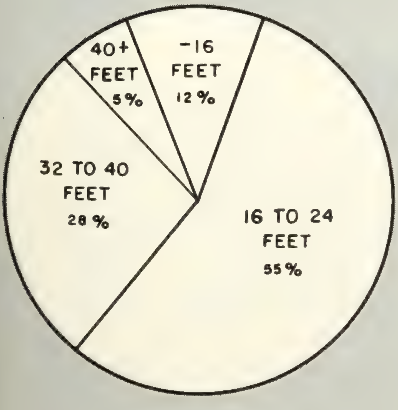
The mean rate of diameter growth for both pole- and sawtimber-size trees was 2 inches in 10 years. However, 15 percent of the poletimber and 10 percent of the sawtimber were growing at a rate of 3 or more inches in 10 years. The rapid growth of these trees indicate that rotations may be shortened under favorable conditions.



A. QUALITY OF SAWTIMBER VOLUME IN TREES 15 INCHES D.B.H. AND LARGER, BY LUMBER LOG GRADES.



B. DISTRIBUTION OF WALNUT SAWTIMBER VOLUME BY D.B.H. CLASS.



C. MERCHANTABLE LENGTH OF SAWTIMBER SIZE WALNUT TREES.

Figure 5. — Black walnut quality indicators.

Trends in Use

Records of the annual cut of walnut timber in recent years are incomplete, but they do show that use of walnut timber for all products has been expanding since 1933. For the years in which a census of wood used in manufacturing was made, the volume of walnut wood used for all products ranged from a low of 28 million board feet in 1933 to 94 million board feet in 1960 (fig. 6). Sawmills, veneer mills, and log exporters purchase walnut timber, but until 1960 at least 75 percent of all walnut logs cut were manufactured into lumber.

Sawmills producing walnut lumber are found throughout the natural range of walnut. Most of these mills saw only a few

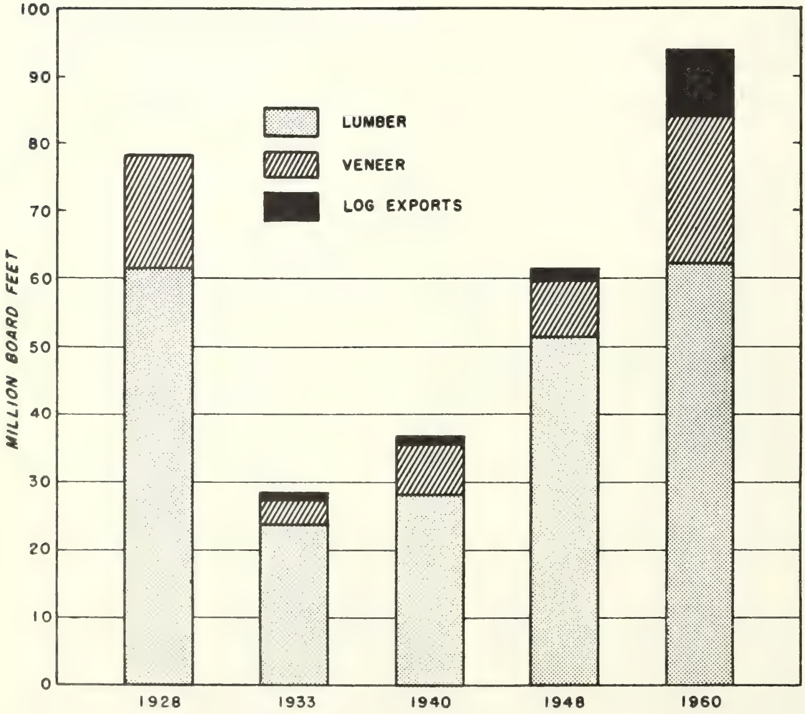
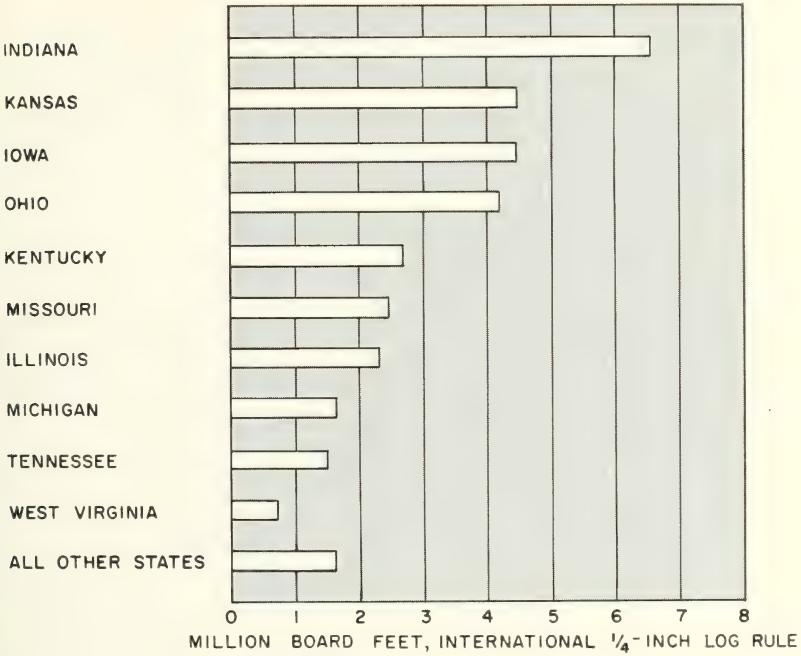


Figure 6. — Walnut wood use in selected years, 1928-1960. Source: WOOD USED IN MANUFACTURING, 1928, 1933, 1940, 1948, 1960; U. S. Forest Serv. and U. S. Dep. of Commerce export statistics.

Figure 7.—Walnut log harvest for domestic veneer mills, by states, 1963. Source: U. S. Forest Serv. Res. Note WO-6, 1964.



thousand feet of walnut lumber annually. However, there are a few mills that specialize in walnut lumber manufacture. Each of these may saw as much as 5 million feet of walnut lumber annually.

A number of walnut-using firms operate both veneer mills and sawmills. They produce veneer from the veneer-quality logs and saw the remainder into lumber. A few sawmill operators specialize in the production of walnut gunstocks. The walnut lumber then moves to furniture plants, other industrial plants, or even overseas.

The leading states in the production of walnut lumber are Illinois, Indiana, Iowa, Kansas, Kentucky, Missouri, Ohio, Tennessee, and West Virginia.

The volume of walnut wood used in domestic veneer manufacture has doubled in recent years. In 1963, domestic veneer mills used approximately 32 million board feet (International ¼-inch log rule). States having the largest walnut veneer-log production were: Indiana, Kansas, Iowa, and Ohio (fig. 7). Veneer production also is concentrated in the central region. Most of the walnut-using veneer mills are in Indiana.

Walnut logs, bolts, and hewn timbers are being exported in increasing quantities. Only 10 years ago less than a million board feet were exported annually. By 1963, exports had grown to more than 16 million board feet. West Germany and Italy received about half the total. Other countries receiving large quantities were Canada, Japan, Switzerland, The Netherlands, and the United Kingdom. The exported logs are manufactured into veneer and plywood to be used in fine furniture. Many sawmill operators and log buyers serve as concentrators for the exporters. During recent years, the export of walnut logs, bolts, and hewn timbers was reported by the Bureau of the Census as follows:

Year	*Quantity, log scale (thousand board feet)*
1957	1,395
1958	2,280
1959	3,734
1960	10,185
1961	7,171
1962	10,320
1963	14,388
1964	9,640

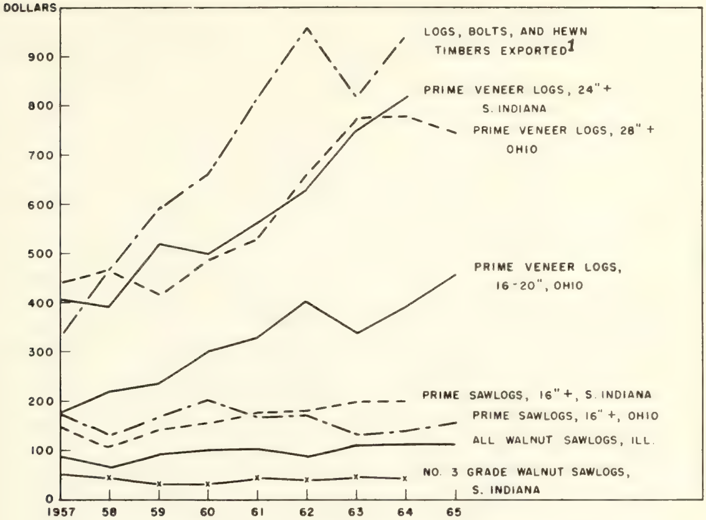
The decrease in exports in 1964 was the result of a quota placed in effect on February 14, 1964. The control on exports was removed in February 1965, and that year 18 million board feet of walnut logs, bolts, and hewn timbers were exported.

Timber Values

Because high-quality walnut trees are so valuable for veneer and other high-priced products, walnut trees are often hunted for and sold individually. The prices paid depend not only on the log volume and quality, but also on the competition among buyers.

Most walnut logs are bought and sold according to the Doyle Log Rule (table 5), but a number of grading systems are used to determine log quality. Some of the more popular rules include the

Figure 8. — Average walnut log prices, 1957-65, in dollars per thousand board feet, Doyle scale. Source: Ohio, Indiana, and Illinois timber price reports and U. S. Bureau of Census export statistics.



[1] Value at port of export, including inland freight, insurance, and other charges.

American Walnut Manufacturers' Association Grading Rules, the Purdue Hardwood Log Grades, the Ohio Standard Saw Log Grades, and the Walnut Saw Log Quality Classes (tables 6 to 9).

Price ranges and averages for walnut logs are reported in several state timber price reports and in Bureau of the Census export publications. The prices are based on grades commonly used in a particular state. In Indiana it is the Purdue Hardwood Log Grades. In Ohio it is the Ohio Standard Saw Log Grades.

Average log prices range from $50 to $960 per thousand board feet depending on the market, log quality, and place of sale. Since 1957, the price trend has been steadily upward for the large veneer-quality logs (fig. 8).

In 1963, walnut logs harvested for domestic veneer mills and export had a value of more than $26 million at average prices for delivered logs. Sawlogs used in lumber manufacture would increase the walnut log crop value by another $6 million.

Nuts Also a Crop

The nuts of the black walnut are important both as a food crop and for use as seed. Of our native tree nuts, walnuts are second in commercial use only to pecans. Walnut meats have a distinctive flavor that makes them favorites for use in candies, bread, and similar uses.

The nuts, which often grow in pairs, are encased in a thick green hull. The shell is very tough, which makes removal of the meat by hand difficult. Some selected varieties are cultured for the sake of large nut meats and relatively thin shells.

A native black walnut tree will bear nuts 8 to 12 years after planting; best production occurs after about 30 years. Special varieties may bear nuts 2 to 3 years after planting. At 15 to 20 years, some of the improved varieties produce about 2 bushels of nuts per tree, whereas native wild trees produce about 1/4 bushel. The Kentucky Department of Conservation estimates that 17 to 20 million pounds of walnuts are produced each year in Kentucky, of which only about one-half are harvested.

Collection of black walnuts for seed reached an alltime record in 1965, when more than 18,400 bushels (approximately 7 million nuts) were gathered in 14 states. This was 31 percent more than the previous year's collection. The 14 states reporting were Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Missouri, Nebraska, North Carolina, Ohio, Tennessee, Virginia, West Virginia, and Wisconsin.

Some uses have also been found for walnut shells. Cleaned and processed, they are used as abrasives and in filter materials.

The hulls may have some importance for medicinal purposes. A Columbia University research team reported that extracts from the green walnut hull were capable of immobilizing fish, mice, rats, and rabbits.

Use in Manufacturing

The Census of Wood Used in Manufacturing in 1960 shows that furniture and fixtures are the principal items made from walnut lumber and veneer. In the furniture industry, black walnut is one of the major hardwoods used. In 1960, 14 percent of the domestic hardwood veneer and plywood used in the manufacture of furniture was black walnut. Between 1948 and 1960, hardwood plywood and veneer consumption increased by 25 percent, but during the same period black walnut veneer and plywood consumption increased five-fold.

Other important items for which walnut lumber is used are gunstocks, millwork, dimension stock, musical instruments, lamps, signs, sporting goods, caskets, and cabinets for sewing machines, radios, and television sets.

Walnut veneer — on plywood and other core-materials — is commonly used for wall paneling, trailer coach interiors, advertising signs, musical instruments, and cabinets for sewing machines, radios, and television sets.

The Outlook

It is likely that demand will continue to be strong but that increasing difficulties will be encountered in obtaining the quality of walnut wood that is desired. The volume of walnut timber that will be available and used in future years is subject to future supply and demand relationships. Demand will depend largely on population, per-capita income, and consumer preference changes, and on the relation of walnut timber prices to competing product prices. Supply will vary with the level of forest management, technological developments, institutional arrangements, and annual cut and growth.

A comparison of current growth and cut — using medium growth estimates and the latest timber-cut estimates converted to standard units — shows that the current annual cut of all grades of walnut timber is slightly less than the growth accruing annually on commercial forest land. However, when quality is considered, the picture is strikingly different. The annual cut of high-quality material exceeds the annual increase in quality material by 47 percent (fig. 9). Supplies of quality logs are dwindling.

In this prevailing situation, the outlook for high-quality walnut timber in sufficient quantity to supply the current and increasing demand is not promising. Instead, we expect that both the growth and the cut in future years will be lower (fig. 10).

In Kentucky, which has been surveyed since the 1962 appraisal, preliminary results show that walnut sawtimber volume is down about one-third from the 1962 appraisal estimates. Also, in Kentucky in 1963 the sawtimber cut exceeded annual growth of walnut timber on commercial forest land by 20 percent.

As previously mentioned, the walnut trees growing on nonforest land have not been included in inventory estimates. However, because some firms report using timber from these sources, the U. S. Forest Service has made surveys of the walnut volume oc-

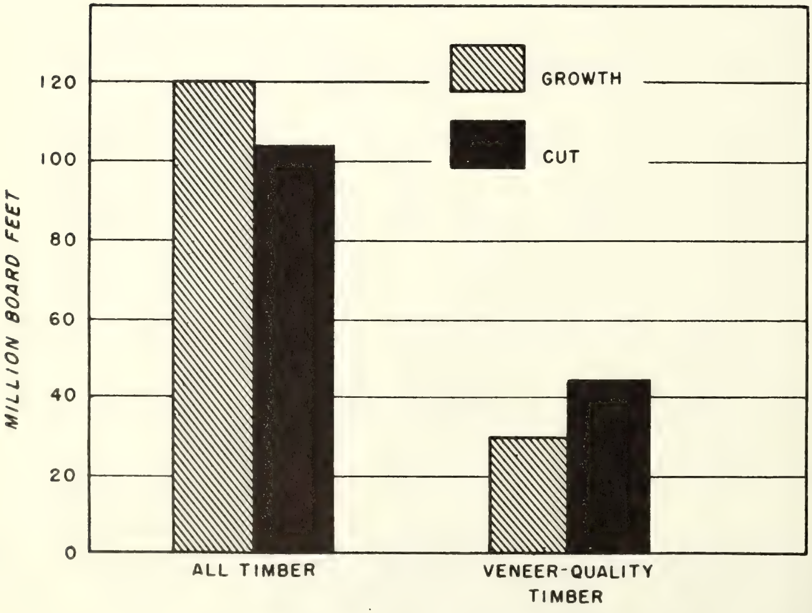


Figure 9. — Estimated current annual growth-cut relationship for walnut timber.

curring on lands not classed as forested in Kentucky and Kansas. Report on these states are being prepared for publication. In the nonforest land survey, the walnut trees tallied included single trees or blocks of trees smaller than 1 acre; and roadside, streamside, shelterbelt, and fence-row strips of timber that had crowns less than 120 feet wide.

Preliminary results of this survey in Kentucky show that a large number of walnut trees are growing on nonforest land. However, they generally are of low quality. About 40 percent of the sawtimber-size trees are culls; that is, they do not meet survey merchantability standards (table 4). Even so, in the Blue Grass area of Kentucky black walnut trees of sawtimber size and quality were found at the rate of one tree per 10 acres of open land. In the rest of the State, the average occurrence was about one tree per 25 acres of open land.

The survey showed that approximately 57 million board feet (International 1/4-inch rule) of sawtimber was growing on nonforest land in Kentucky. An additional 5 million board feet of timber was found in trees classed as cull because their merchantable length was only 6 or 7 feet. More than half of the sawtimber volume was in the Blue Grass area where narrow strips of trees occur frequently in fence rows and along streams. The walnut sawtimber volume on nonforest land was distributed among tree-size classes as follows:

Diameter at breast height (inches)	*Percent*
11.0 to 14.9	46
15.0 to 18.9	30
19.0 plus	30

Log quality was similar to that found on trees in the forest land. About 45 percent of the volume of trees 15 inches d.b.h. and larger was in log grades 1 or 2.

Black walnut trees on nonforested areas can augment the harvest from commercial forest land. However, timber quality on these areas is as low or lower than in commercial forest areas. In the long run, intensively managing our present resources and establishing plantations are the only sure ways to provide increasing quantities of high-quality walnut timber. But, improved

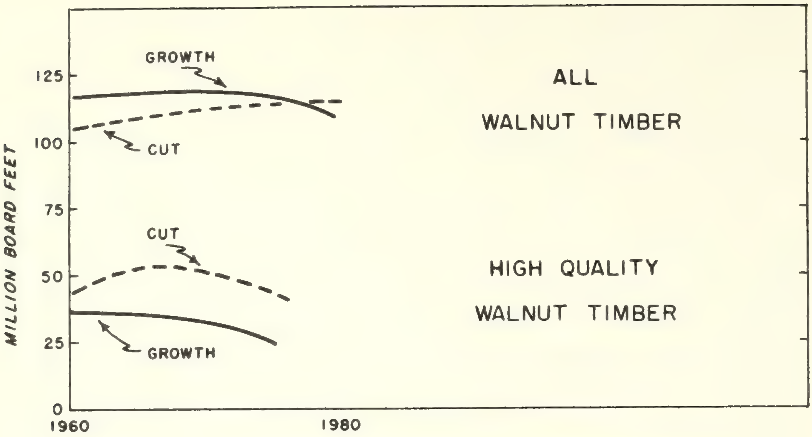


Figure 10. — Probable future growth-cut relationship for black walnut timber.

management depends on better knowledge of the responses to management actions.

A research program conducted by the U. S. Forest Service is providing this information. Studies are now under way on walnut timber management concerned with seeding and planting; yield and quality control; and the relation of yield to soil, site characteristics, and cultural work such as fertilization, hybridization, irrigation, pruning, spacing, and seed selection. The success of management efforts will control the future supply of black walnut timber.

●

Appendix
I

TABULAR DATA

Table 1. — Volume of walnut growing stock and sawtimber on commercial forest land, by regions, 1963[1]

Region	Growing stock[2]	Sawtimber
	Million cubic feet	*Million board feet*[3]
Central	506	1,532
Atlantic	274	657
Gulf	124	308
Plains	102	140
Lake	24	72
Total	1,030	2,709

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[1] Commercial forest land. — Includes forest land that is producing or is physically capable of producing usable crops of industrial wood (usually sawlogs and pulpwood but excluding fuelwood), economically available now or prospectively, and not withdrawn from timber utilization.

[2] Growing stock. — Net volume of live merchantable sawtimber and poletimber trees from stump to a minimum 4-inch-top diameter outside bark of central stem. Sawtimber trees are live merchantable trees 11.0 inches d.b.h. and larger. Poletimber trees are live merchantable trees 5.0 to 10.9 inches d.h.b. A black walnut board-foot volume table is in appendix (table 3). Cubic volume is computed in cubic feet of unpeeled wood, using a Lake States Composite Volume Table and correcting for bark thickness by species and diameter class.

[3] International ¼-inch rule.

Table 2. — Walnut used in manufacturing, by industry group and form of wood, 1960

Industry group	Form of wood		
	Lumber	Veneer	Plywood
	Million board feet	*Million square feet*[1]	*Million square feet*[2]
Wood household furniture	21.8	3.8	15.6
Wood office furniture	7.4	.7	3.5
Partitions, fixtures, and other furniture	3.7	.1	4.9
Dimension and flooring	5.1	—	.2
Sawmills and planing mills	4.7	([3])	.1
Veneer and plywood plants	.3	.7	9.3
Millwork plants	3.2	.2	2.4
Wood products not elsewhere classified	7.3	.8	.1
Transportation equipment	2.3	—	6.4
Signs and advertising	1.5	.1	5.7
Electrical equipment	1.4	([3])	.7
Musical instruments	.8	.4	.1
Toys and sporting goods	.7	—	([3])
Morticians' goods	.7	—	—
All other	.9	([3])	1.2
Total	61.8	6.8	50.2

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[1] 1-inch basis.

[2] Surface measure.

[3] Less than 50,000 square feet.

Table 3. — Black walnut volume table

(Gross volume in board feet[1] — International ¼-inch rule)

D.b.h.	Merchantable log length in feet							
	8	16	24	32	40	48	56	64
10	20	38	—	—	—	—	—	—
12	29	55	78	97	—	—	—	—
14	41	77	107	136	158	178	—	—
16	57	102	143	175	207	240	266	286
18	72	131	182	228	270	310	349	388
20	89	165	229	286	339	388	436	485
22	109	203	281	351	417	480	538	592
24	129	244	336	417	495	577	650	718
26	153	291	398	495	587	679	764	854
28	181	338	466	577	679	786	892	989
30	213	398	533	664	786	902	1,028	1,145
32	246	456	616	766	902	1,038	1,174	1,309
34	282	514	703	873	1,028	1,174	1,339	1,484
36	323	582	795	980	1,154	1,329	1,503	1,673

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[1] Merchantable volume from a 1-foot stump to an 8-inch top. Volume corrected by a 3-percent factor based on data from walnut studies in Kansas and Missouri.

Source: U. S. Dep. Agr. Tech. Bull. 1104 (tables 2 and 14), January 1955.

Table 4. — **Hardwood log-grading rule used in forest resource surveys**[1]

Grading factors		Lumber logs					Tie-and-timber logs
		Log grade 1			Log grade 2	Log grade 3	Log grade 3
		Butts only	Butts and uppers		Butts and uppers	Butts and uppers	Butts and uppers
Minimum diameter (inches)		13-15	16-19	20+	11	8+	8+
Minimum length (feet)		12+	12+		12+	8+	8+
Clear cuttings on three best faces	Min. length (feet)	7	5	3	3	2	Not graded on cutting basis: sound knots permitted if diameter of knot collar is not more than 1/3 of log diameter at that point; whorled or group knots occurring within a 6-inch vertical distance permitted if aggregate collar diameters do not exceed 1/3 of log diameter at that point; any number of unsound defects of any size permitted if they can be slabbed off.
	Max. number on face	2	2		3	Unlimited	
	Min. yield in face length	5/6	5/6		4/6	3/6	
Max. sweep and crook deduction (percent)		15	15		30	50	Allowable sweep in inches equal to ¼ d.i.b. at small end of log.
Max. cull and sweep deduction (percent)		40	40		50	50	No unsound internal defect permitted.

Exceptions: In ash and basswood 12 inches d.i.b. for grade 1 butts.

[1] Surveys made in the Central States by the Central States Forest Experiment Station, U. S. Forest Service. These rules for grading logs in trees are based on the Hardwood Log Grades for Standard Lumber developed by the Forest Products Laboratory, U. S. Forest Service.

Table 5. — Log scale Doyle rule[1]

(In board feet)

Top d.i.b (inches)	Log length — feet				
	8	10	12	14	16
8	8	10	12	14	16
10	18	22	27	32	36
12	32	40	48	56	64
14	50	62	75	88	100
16	72	90	108	126	144
18	98	122	147	172	196
20	128	160	192	224	256
22	162	202	243	284	324
24	200	250	300	350	400
26	242	302	363	424	484
28	288	360	432	504	576
30	338	422	507	592	676
32	392	490	588	686	784
34	450	562	675	788	900
36	512	640	768	896	1,024
38	578	722	867	1,012	1,156
40	648	810	972	1,134	1,296

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[1] The log scale commonly used in sales of walnut timber.

Table 6. — **Grading rules of the American Walnut Manufacturers' Association**

Log grade	Diameter	Length	Minimum quality standards
	Inches	*Feet*	
Prime	12 butt	8+	Sound, straight, free of all defects, including iron.
	16 butt	6 to 7	Sound, straight, free of all defects, including iron.
Select	16 butt	8+	Three clear faces and no unsound defects.
	16 2nd cut	8+	Clear all defects.
	Prime logs except for slight crook.		
No. 2	12+	8+	Two clear faces.
	12 to 15	6 to 7	Clear logs.
	16+	6 to 7	Three clear faces.
Cull	All logs that will not meet above specifications.		

Source: U. S. Dep. Agr. Farmers' Bull. 1459, 1959.

Table 7. — **Purdue hardwood log grades**[1]

Log grade	Minimum quality standards
Prime	Practically (90 percent) surface clear on three visible faces (a face is any ¼ of the surface of a log). Must be 16 inches or more in diameter inside bark at the small end.
No. 1	At least ¾ of the log length on the three visible faces must be surface clear in one section. Must be at least 14 inches in diameter inside bark at the small end.
No. 2	At least ½ of the log length must be surface clear on the three visible faces in one section or in two sections, neither of which can be less than 3 feet long. Must be at least 10 inches in diameter inside bark at the small end.
No. 3	Will not meet No. 2 specifications.

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[1] Log grade rules developed by Purdue University and used in Indiana log-price reporting.

Table 8. — Ohio standard sawlog grades[1]

Log grade	Sawlog grade specifications			
	Minimum length	Minimum top diameter inside bark	Maximum sweep— percent of top diameter in inches	Other specifications
	Feet	*Inches*	*Percent*	
Prime	8	16	15	The grading face (poorest of the three best faces)[2] must be 5/6 clear and free from defects in 1 or 2 clear cuttings, each of which must be 7 feet or longer.
No. 1	8	14	15	The grading face (poorest of the three best faces) must be 4/6 clear and free from defects in 1 or 2 cuttings, each of which must be 5 feet or longer.
No. 2	8	12	15	The grading face (poorest of the three best faces) must be 3/6 clear and free from defects in 1 or 2 cuttings, each of which is 3 feet or longer.
No. 3	8	10	—	Logs must be straight and sound with no heart defects.
Cull	—	—	—	Below No. 3 logs.

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[1] Prepared by the Log Grades Committee of the Ohio Forestry Association and used in Ohio timber price reporting.

[2] The poorest face is disregarded for grading purposes. The next best face is used for grading.

Note: There are occasional logs of top quality or special use that will not be included in these grades.

Table 9. — Specifications for walnut sawlog quality classes based on N.H.L.A. rules for grading walnut lumber
(In inches)

Quality factors	Prime[1]	Select[2]	Common[3]
Minimum diameter, inches:			
Butts	12	12	—
Uppers	13	13	9
Minimum length, feet	6	6	6
Minimum clear faces (out of four)	Two clear and one 5/6 clear	One clear and two 2/3 clear	None clear and three 2/3 clear
Clear cuttings, feet:			
Length	4 and up	3 and up	2 and up
Maximum number on face	2	3	unlimited
Maximum cull deduction,[4] percent	25	33 1/3	50
End defects	Instructions given in text		

Exceptions:

[1] Will admit 11-inch butts and 12-inch uppers with 3 clear faces and 1 face 5/6 clear; also 16-inch butts and uppers with 1 clear face and 2 faces 5/6 clear.

[2] Will admit 11-inch butts and 12-inch uppers with 2 clear faces and 2 faces 2/3 clear; also 16-inch butts and uppers with no clear faces and 3 faces 2/3 clear.

[3] Logs that do not meet specifications for common quality are cull.

[4] Logs whose combined scale deduction for sweep and cull exceeds the maximum allowable are dropped into the appropriate quality class.

Source: King, W. W. 1958. Evaluating quality black walnut sawlogs. Forest Prod. J. 8 (9): 243-248.

II

ACCURACY OF ESTIMATES

Because walnut is a minor species in every state in which it occurs, the volume and growth estimates of the walnut resource are subject to rather sizable sampling errors. The estimates are based on classification of a large number of points on aerial photographs, followed by field verification and tree measurement of a sample of the photo points. Estimates of volume obtained in surveys completed within the 3 years prior to 1963 were used without change. In other states, data for the most recent forest survey were updated to 1963.

The error of estimate per billion cubic feet of timber in states where walnut is important ranges from 2.9 to 6.6 percent, and for most states the estimate error is less than 5 percent per billion cubic feet. About a billion cubic feet of walnut is found in the eastern United States. Therefore, it is estimated that the total walnut volume on commercial forest land in the United States has a sampling error of about 5 percent. This means that the chances are two out of three that the reported nationwide walnut volume of 1 billion cubic feet of walnut on commercial forest land does not differ from the actual volume by more than 5 percent.

Sampling errors increase for smaller volumes. They may be approximated from the following tabulation developed for use in estimating sampling errors in the nationwide forest survey.

Timber volume (Million cubic feet)	*Approximate sampling error (Percent)*
500	7
250	10
100	16
50	23
10	50

Another source of discrepancy in growth/cut comparisons is the use of both the Doyle and International ¼-inch log rules to report volumes. The Doyle rule consistently scales smaller board-foot volumes than the International ¼-inch rule on logs smaller than 26 inches top diameter inside bark; but for logs larger than 26 inches, the Doyle rule gives more volume than the International ¼-inch rule.

III

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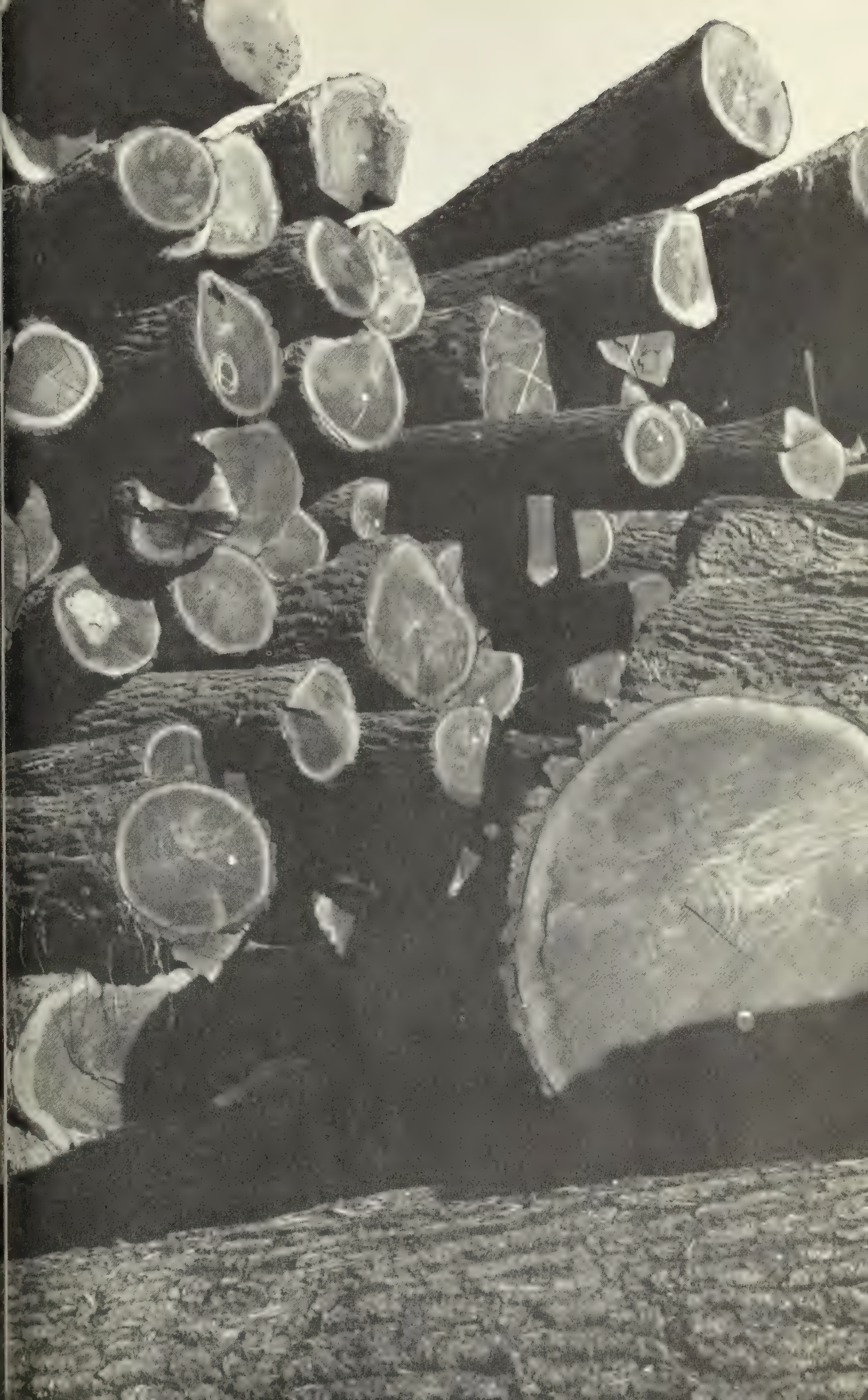

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PULPWOOD PRODUCTION in the Northeast
1964

CLEMSON UNIVERSITY
APR 17
S.C. TECH. & AGR. DIV.

by Neal P. Kingsley

U. S. FOREST SERVICE RESOURCE BULLETIN NE-5
1967

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

The Author —

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PULPWOOD PRODUCTION in the Northeast 1964

Second Annual Survey

THIS is a report on the second in a series of annual surveys of pulpwood production in the 12 Northeastern States — Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and West Virginia.

This survey was conducted by means of a mail questionnaire sent to woodpulp mills in ten of the Northeastern States and two provinces of Canada. Data for production of pulpwood in Maine and Vermont were supplied by the forestry agencies of those states. In all, this report is a compilation of data from the 71 woodpulp mills and wood-chipping plants that consume or produce the Northeast's pulpwood.

This second annual survey of pulpwood production in the Northeast showed a gain of 4.6 percent over the 1963 production. The production of all material used in the manufacture of woodpulp amounted to 4,508,900 cords. Production of round pulpwood rose from 3.5 percent to 4,128,200 cords. The production of wood-industry byproducts rose 16 percent from 1963. This increase was accounted for by a sharp gain in wood-chip production, coupled with a substantial increase in the production of other forms of wood-industry byproducts.

Round Pulpwood Production

Production of round pulpwood rose from 3,990,000 cords in 1963 to 4,128,200 cords in 1964 (table 1). This represents an increase of 138,200 cords. Receipts of round pulpwood by woodpulp mills in the Northeast increased from 4,217,100 cords in 1963 to 4,527,400 cords in 1964. These receipts include round pulpwood produced outside of the 12-state area (table 4). Thus the Northeast in 1964 produced 91 percent of the round pulpwood received by northeastern woodpulp mills.

Among the states, Maine led again in round pulpwood production with 2,242,800 cords—54 percent of the region's total output (table 1). Maine's 1964 total is a gain of 4 percent over its 1963 total of 2,150,600 cords. Once again, Pennsylvania placed second with 575,500 cords and also widened its lead over New York, which produced 366,100 cords. Pennsylvania produced 14 percent of the region's total while New York contributed 11 percent. In 1963, the production was 13 and 10 percent respectively. Pennsylvania's widening lead over New York was primarily the result of a 12-percent drop in round pulpwood production in New York while Pennsylvania gained 12 percent over 1963. West Virginia again held fourth position with 314,300 cords. This is a gain of 14,100 cords, 5 percent, over 1963. As in 1963, these four states produced approximately 85 percent of the 12-state total.

Four states showed outstanding gains in production. Rhode Island, the twelfth ranking producer, registered a 29-percent gain over 1963 production. Delaware showed a 21-percent gain over 1963, but remained in ninth place. Connecticut remained in eleventh position, but increased its total by 15 percent. Maryland had a 10-percent increase in round pulpwood production; and it now ranks sixth in production, the position held by Vermont in 1963.

While these increases are lost in the regional total, they are significant in the states in which they occur. Such sudden substantial increases could have a significant effect on the timber economy of the state.

Seventeen counties in the Northeast produced more than 50,000 cords of round pulpwood in 1964 (tables 5 through 16 and figure 1). Eleven of these counties are in Maine, 3 in Pennsylvania, and 1 each in New York, New Hampshire, and Vermont. By comparison, 15 counties produced more than 50,000 cords in 1963. The 11 counties in Maine produced more than 50,000 cords in 1963, as did Coos County, New Hampshire, and Essex County, Vermont Changes occurred, however, in New York and Pennsylvania.

In New York, Essex County was the only county to produce more than 50,000 cords in 1964—56,400 cords as compared with 41,300 cords in 1963. The big New York producers of 1963, Hamilton and St. Lawrence Counties, dropped to 41,200 cords and 33,900 cords respectively in 1964. Three of Pennsylvania's 67 counties exceeded the 50,000-cord mark in 1964. These were clearfield—60,000 cords, Bedford—57,000 cords, and Huntingdon—54,500 cords.

The county with the highest production was Aroostook County, Maine, which produced 441,700 cords of round pulpwood in 1964. This total is more than the New York State total. In fact, Aroostook County's total production is nearly 11 percent of the combined 12-state total. Aroostook County exceeded the next highest producer, Somerset County, Maine, by 79,300 cords. Somerset County produced 362,400 cords of roundwood in 1964.

A look at the map (fig. 1) puts Aroostook County's lead in perspective. Aroostook County is larger in area than Connecticut and nearly as big as Massachusetts. Moreover, the second-place county, Somerset, is larger than Delaware and nearly as large as Connecticut. When viewed in this light, it is doubtful that these two counties would fare as well if the comparison were made on the basis of round pulpwood harvest per acre of commercial forest land.

Softwood species accounted for 58 percent of the total round pulpwood production (table 1). Once again, the spruce and fir species group provided the highest percentage of the softwood total—72 percent. Four States—Maine, New Hampshire, New York, and Vermont—were the only spruce-fir producing states in the region, the same as for 1963. Among the hardwood species groups, the other hardwood[1] group was again the leader, even though an additional species group, oak and hickory had been added to the hardwood category. In Pennsylvania, oak and hickory accounted for 231,400 cords—the highest volume of any state. Other hardwoods accounted for 247,200 cords in Pennsylvania, exceeding oak and hickory by 7 percent. In West Virginia, the other hardwoods barely exceeded the oak and hickory group.

Four States—Maine, New Hampshire, New York, and Vermont—reported no oak and hickory pulpwood production. Undoubtedly some oak and hickory was cut for pulpwood in these states. However, it was probably reported with the other hardwood group by the reporting mill since the total was too small to warrant segregating.

Wood Chips and Miscellaneous Byproducts

In addition to round pulpwood, woodpulp mills also consume various byproducts of other wood-using industries. An increasingly important source of raw material for woodpulp mills is the slabs and edgings produced by sawmills. With the advent of sawlog debarkers it has become possible to debark and chip this material for use by pulpmills. Nearly all of the chips produced in the Northeast are produced from slabs and edgings.

Another, although presently minor, source of raw material is other types of wood-industry byproducts. This material consists of a variety of items. It may be post or pole trimmings, veneer cores, or many other forms of scrap material that would be considered waste by the producer. The most common miscellaneous byproducts are veneer cores.

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[1] Other hardwoods include all hardwoods other than aspen, yellow-poplar, the oaks, and the hickories.

Wood chip production for shipment to woodpulp mills in the Northeast totaled 370,600 cords in 1964 (table 2). This was an increase of 9 percent (54,400 cords) from 1963. Production of softwood chips fell from 197,300 cords in 1963 to 175,100 cords in 1964. The hardwood chip total rose from 118,900 cords in 1963 to 195,500 cords in 1964—an increase of 64 percent. Production of chips increased in 6 states and decreased in 2; and 4 states did not produce wood chips.

The use of miscellaneous wood industry byproducts in the manufacture of woodpulp showed a sharp increase from 1963 (table 3). The use of byproducts, 10,200 cords in 1964, tripled the 1963 production. New Hampshire, which did not convert any byproducts into woodpulp in 1963, accounted for most of the increase with 6,800 cords. Vermont doubled its 1963 production to add 1,200 cords to the 1964 total. New Jersey, the leading producer in 1963 with 2,400 cords, fell to second place in 1964 with 2,100 cords. Of the total 10,200 cords, 90 percent was hardwood in 1964, while in 1963, 35 percent produced was hardwood.

■

Table 1.—Round pulpwood production in the Northeast, by state and species group, 1964

(In thousands of rough cords)

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hard-woods	Total	
Connecticut	—	5.4	3.0	8.4	—	6.2	3.5	9.7	18.1
Delaware	—	—	31.7	31.7	—	.1	.2	.3	32.0
Maine	1,444.3	179.4	58.6	1,682.3	80.2	—	480.3	560.5	2,242.8
Maryland	—	—	72.0	72.0	—	39.3	40.4	79.7	151.7
Massachusetts	—	—	11.2	11.2	—	4.6	9.1	13.7	24.9
New Hampshire	95.4	9.1	3.8	108.3	2.3	—	75.0	77.3	185.6
New Jersey	—	—	41.9	41.9	—	15.4	—	15.4	57.3
New York	72.1	9.2	42.8	124.1	19.1	—	222.9	242.0	366.1
Pennsylvania	—	8.5	81.0	89.5	7.4	231.4	247.2	486.0	575.5
Rhode Island	—	—	4.0	4.0	—	4.5	1.7	6.2	10.2
Vermont	105.9	4.1	4.2	114.2	3.8	—	31.7	35.3	149.7
West Virginia	—	—	109.6	109.6	—	102.2	102.5	204.7	314.3
Total	1,717.7	215.7	463.8	2,397.2	112.8	403.7	1,214.5	1,731.0	4,128.2

Table 2.—Pulpwood chip production in the Northeast, by state and destination and by softwood and hardwood, 1964[1]

(In thousands of cords)

State[2]	Total production			Consumed within state			Consumed in other states		
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total
Maine	84.9	6.7	91.6	77.3	6.7	84.0	.7	—	.7 (Mass.)
							6.9	(*)	6.9 (N. H.)
Maryland	26.9	11.2	38.1	—	—	—	3.4	—	3.4 (N. J.)
							23.5	11.2	34.7 (Pa.)
Massachusetts	1.8	7.0	8.8	—	—	—	1.8	7.0	8.8 (N. Y.)
New Hampshire	38.2	9.4	47.6	27.3	8.6	35.9	—	(*)	(*) (Mass.)
							10.5	.8	11.3 (Maine)
							.4	—	.4 (R. I.)
New York	14.2	32.7	46.9	13.4	27.4	40.8	—	3.6	3.6 (N. J.)
							.8	1.7	2.5 (Ontario)
Pennsylvania	1.1	29.9	31.0	1.1	29.9	31.0	—	—	—
Vermont	8.0	14.8	22.8	—	—	—	1.1	—	1.1 (N. H.)
							6.9	14.8	21.7 (N. Y.)
West Virginia	—	83.8	83.8	—	—	—	—	83.8	83.8 (Ohio)
Virginia	—	—	—	—	—	—	20.5	—	20.5 (Pa.)
Canada	—	—	—	—	—	—	3.8	.4	4.2 (Maine)
							(*)	—	(*) (N. H.)
Total	175.1	195.5	370.6	119.1	72.6	191.7	80.3	123.3	203.6

* Less than 50 cords.

[1] The data presented in this table are for pulpwood chips produced, by state. They do not represent the source of raw material for chipping plants (sawmill slabs and edgings); nor do they include wood chips not used in the manufacture of woodpulp.

[2] States with no production are omitted.

Table 3.—Miscellaneous wood industry byproducts used in woodpulp manufacture, by state and destination and by softwood and hardwood, 1964

(In thousands of cords)

State[1]	Total production			Consumed within state			Consumed in other states		
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total
New Hampshire	—	6.8	6.8	—	—	—	—	6.8	6.8 (Maine)
New Jersey	1.0	1.1	2.1	1.0	1.1	2.1	—	—	—
Vermont	(*)	1.2	1.2	—	—	—	(*)	1.2	1.2 (N. Y.)
West Virginia	—	.1	.1	—	—	—	—	.1	.1
Total	1.0	9.2	10.2	1.0	1.1	2.1	(*)	8.1	8.1

* Less than 50 cords.

[1] States with no production are omitted.

Table 4.—Roundwood received from outside the Northeast, 1964

(In thousands of rough cords)

Source of production and species group	Destination					Total received
	Maryland	Maine	New Hampshire	Pennsylvania	New York	
Kentucky:						
Softwood	8.6	—	—	—	—	8.6
Hardwood	—	—	—	—	—	—
Total	8.6	—	—	—	—	8.6
Ohio:						
Softwood	7.3	—	—	.7	—	8.0
Hardwood	.2	—	—	2.3	—	2.5
Total	7.5	—	—	3.0	—	10.5
Virginia:						
Softwood	—	—	—	30.6	35.7	66.3
Hardwood	—	—	—	.1	.5	.6
Total	—	—	—	30.7	36.2	66.9
Total U. S.:						
Softwood	15.9	—	—	31.3	35.7	82.9
Hardwood	.2	—	—	2.4	.5	3.1
Total	16.1	—	—	33.7	36.2	86.0
New Brunswick:						
Softwood	—	163.7	—	—	—	163.7
Hardwood	—	4.3	—	—	—	4.3
Total	—	168.0	—	—	—	168.0
Ontario:						
Softwood	—	—	—	56.8	2.5	59.3
Hardwood	—	—	24.4	—	69.0	94.0
Total	—	—	24.4	56.8	72.1	153.3
Quebec:						
Softwood	—	17.0	18.7	—	37.6	73.3
Hardwood	—	—	22.2	—	29.7	51.9
Total	—	17.0	40.9	—	67.3	125.2
Total Canada:						
Softwood	—	180.7	18.7	56.8	40.1	296.3
Hardwood	—	4.3	46.6	—	99.3	150.2
Total	—	185.0	65.3	56.8	139.4	446.5
Grand Total	16.1	185.0	65.3	90.5	175.6	532.5

Table 5.—Round pulpwood production in Connecticut, by county and species group, 1964

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Fairfield	—	1.4	—	1.4	—	—	—	—	1.4
Hartford	—	—	—	—	—	—	—	—	—
Litchfield	—	—	—	—	—	—	—	—	—
Middlesex	—	—	—	—	—	—	—	—	—
New Haven	—	4.0	—	4.0	—	—	—	—	4.0
New London	—	—	0.8	.8	—	0.9	0.4	1.3	2.1
Tolland	—	—	.4	.4	—	.6	.1	.7	1.1
Windham	—	—	1.8	1.8	—	4.7	3.0	7.7	9.5
Total	—	5.4	3.0	8.4	—	6.2	3.5	9.7	18.1

Table 6.—Round pulpwood production in Delaware, by county and species group, 1964

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Kent	—	—	1.1	1.1	—	—	0.2	0.2	1.3
Newcastle	—	—	(*)	(*)	—	—	—	—	(*)
Sussex	—	—	30.6	30.6	—	0.1	—	.1	30.7
Total	—	—	31.7	31.7	—	0.1	0.2	0.3	32.0

* Less than 50 cords.

Table 7.—Round pulpwood production in Maine, by county and species group, 1964

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Androscoggin	4.0	2.1	13.0	19.1	(*)	—	14.0	14.0	33.1
Aroostook	352.7	13.2	—	365.9	52.4	—	23.4	75.8	441.7
Cumberland	5.5	1.3	12.1	18.9	—	—	32.6	32.6	51.5
Franklin	53.7	5.8	1.1	60.6	.2	—	37.1	37.3	97.9
Hancock	53.7	9.4	(*)	63.1	.1	—	7.0	7.1	70.2
Kennebec	12.1	6.2	1.1	19.4	.1	—	41.1	41.2	60.6
Knox	9.6	1.7	(*)	11.3	—	—	4.0	4.0	15.3
Lincoln	21.0	2.1	5.6	28.7	—	—	11.0	11.0	39.7
Oxford	42.3	10.7	9.2	62.2	.3	—	87.5	87.8	150.0
Penobscot	185.2	60.6	.4	246.2	14.8	—	92.4	107.2	353.4
Piscataquis	237.3	19.7	.3	257.3	11.3	—	25.8	37.1	294.4
Sagadahoc	4.3	1.0	9.2	14.5	—	—	2.9	2.9	17.4
Somerset	302.9	9.7	1.0	313.6	.2	—	48.6	48.8	362.4
Waldo	23.8	1.8	.9	26.5	(*)	—	32.6	32.6	59.1
Washington	136.0	34.0	(*)	170.0	.8	—	4.0	4.8	174.8
York	.2	.1	4.7	5.0	—	—	16.3	16.3	21.3
Total	1,444.3	179.4	58.6	1,682.3	80.2	—	480.3	560.5	2,242.8

* Less than 50 cords.

Table 8.—Round pulpwood production in Maryland, by county and species group, 1964

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Allegheny	—	—	5.5	5.5	—	16.2	17.0	33.2	38.7
Ann Arundel	—	—	3.2	3.2	—	—	—	—	3.2
Baltimore	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Calvert	—	—	—	—	—	—	—	—	—
Caroline	—	—	8.3	8.3	—	—	—	—	8.3
Carroll	—	—	(*)	(*)	—	(*)	(*)	(*)	(*)
Cecil	—	—	.2	.2	—	.1	(*)	.1	.3
Charles	—	—	17.5	17.5	—	—	.1	.1	17.6
Dorchester	—	—	7.6	7.6	—	—	—	—	7.6
Frederick	—	—	.2	.2	—	.1	(*)	.1	.3
Garrett	—	—	1.0	1.0	—	20.9	22.3	43.2	44.2
Harford	—	—	1.	.1	—	(*)	(*)	(*)	.1
Howard	—	—	—	—	—	(*)	—	(*)	(*)
Kent	—	—	1.4	1.4	—	—	—	—	1.4
Montgomery	—	—	.1	.1	—	—	—	—	.1
Prince Georges	—	—	9.8	9.8	—	.1	.2	.3	10.1
Queen Annes	—	—	1.0	1.0	—	—	—	—	1.0
Somerset	—	—	2.9	2.9	—	—	—	—	2.9
Talbot	—	—	1.5	1.5	—	—	—	—	1.5
Washington	—	—	.8	.8	—	1.9	.8	2.7	3.5
Wicomico	—	—	6.2	6.2	—	—	—	—	6.2
Worcester	—	—	4.7	4.7	—	—	—	—	4.7
Total	—	—	72.0	72.0	—	39.3	40.4	79.7	151.7

* Less than 50 cords.

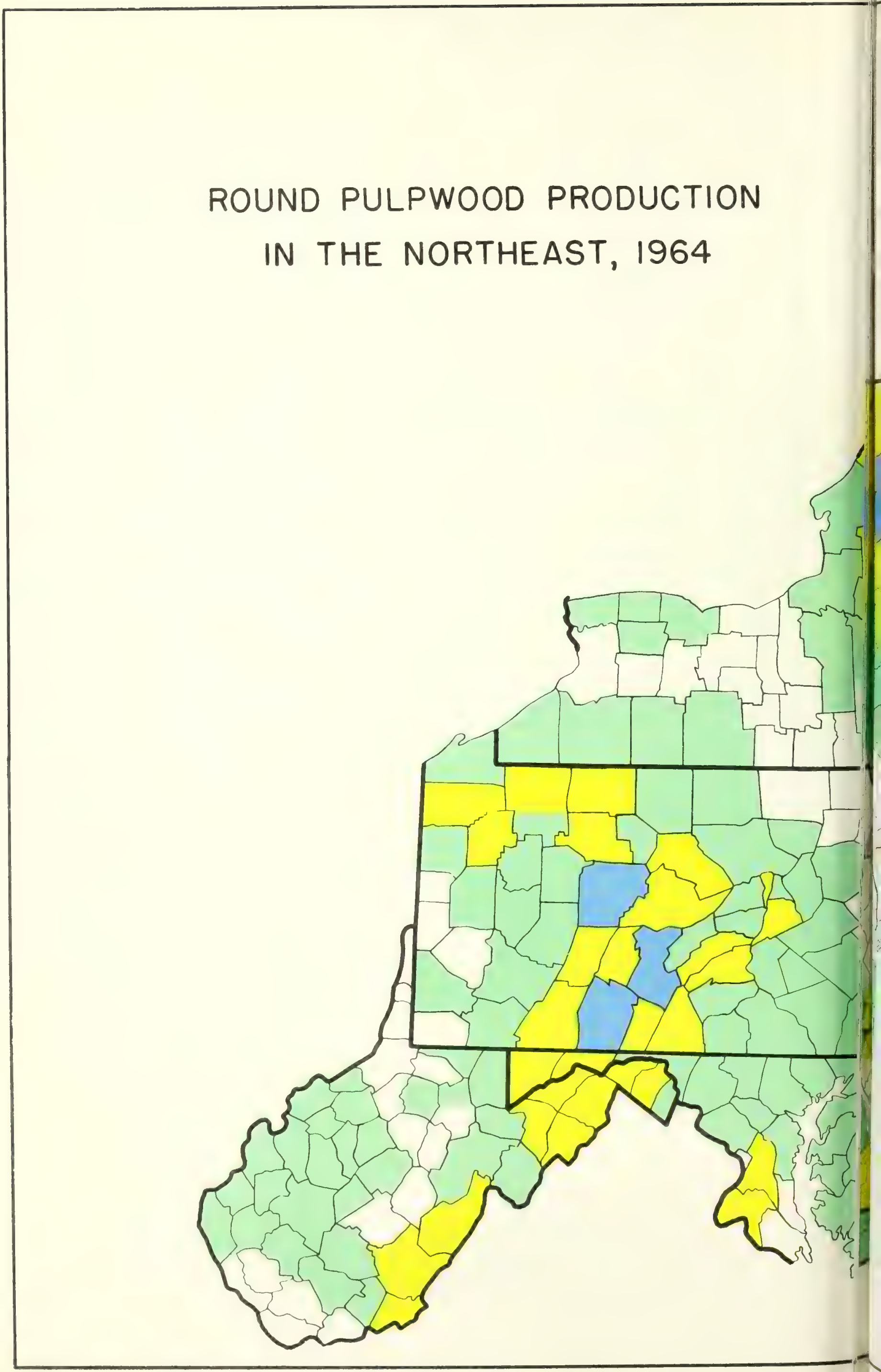

Figure 1.—The geographical pattern of round pulpwood production in the Northeast in 1964.

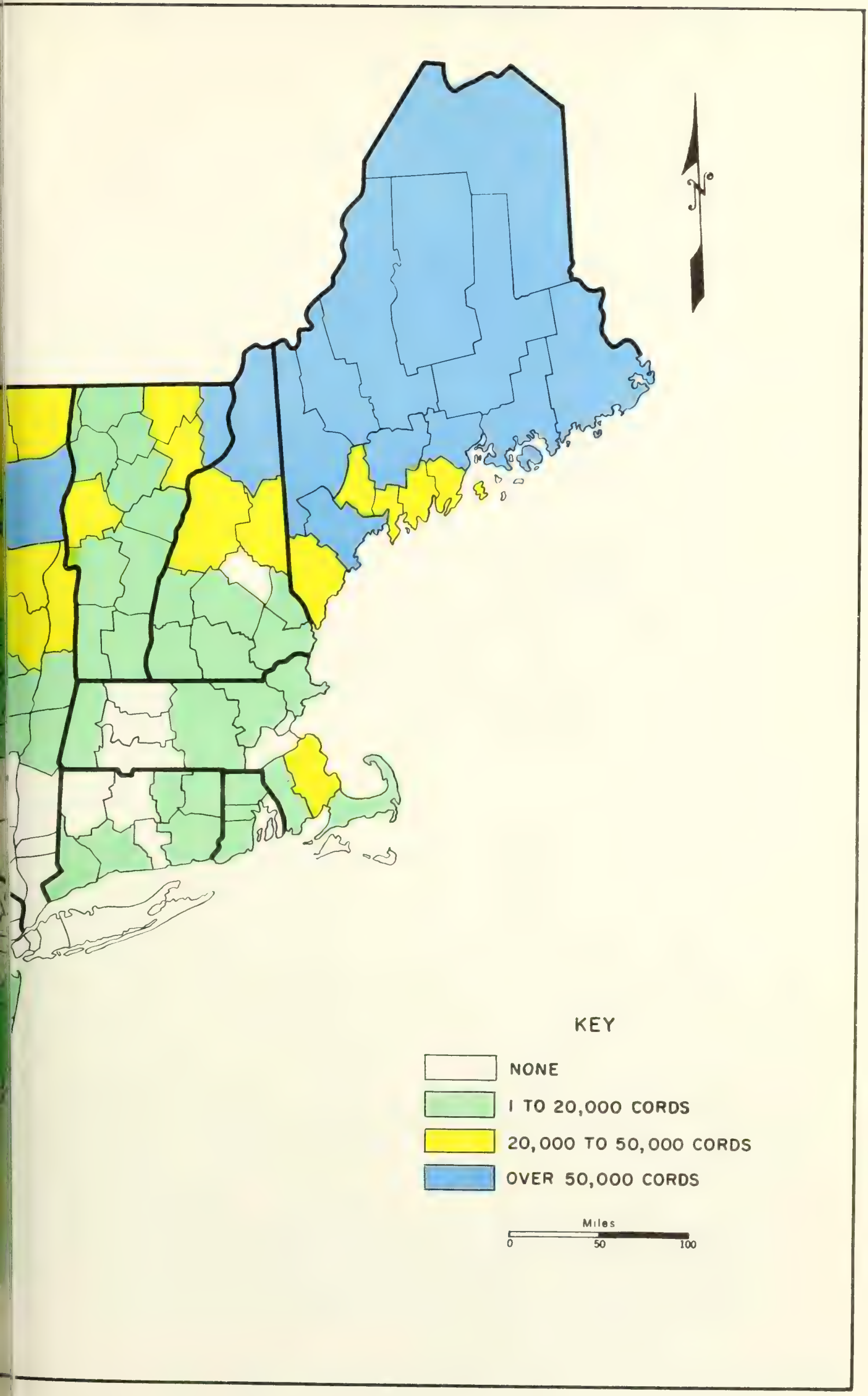
N
KEY
NONE
1 TO 20,000 CORDS
20,000 TO 50,000 CORDS
OVER 50,000 CORDS
Miles
0
50
100

Table 9.—Round pulpwood production in Massachusetts, by county and species group, 1964

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Barnstable	—	—	0.1	0.1	—	—	—	—	0.1
Berkshire	—	—	—	—	—	—	2.0	2.0	2.0
Bristol	—	—	2.6	2.6	—	1.2	1.4	2.6	5.2
Essex	—	—	—	—	—	—	.6	.6	.6
Franklin	—	—	—	—	—	—	—	—	—
Hampden	—	—	—	—	—	—	—	—	—
Hampshire	—	—	—	—	—	—	—	—	—
Middlesex	—	—	—	—	—	—	.5	.5	.5
Norfolk	—	—	—	—	—	—	—	—	—
Plymouth	—	—	8.5	8.5	—	3.4	4.0	7.4	15.9
Suffolk	—	—	—	—	—	—	—	—	—
Worcester	—	—	—	—	—	—	.6	.6	.6
Total	—	—	11.2	11.2	—	4.6	9.1	13.7	24.9

Table 10.—Round pulpwood production in New Hampshire, by county and species group, 1964

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Belknap	—	—	—	—	—	—	—	—	—
Carroll	1.1	.3	0.4	1.8	(*)	—	14.0	14.0	15.8
Cheshire	.1	(*)	(*)	.1	—	—	1.4	1.4	1.5
Coos	83.3	8.4	2.6	94.3	1.9	—	48.4	50.3	144.6
Grafton	10.4	.4	.6	11.4	.3	—	3.9	4.2	15.6
Hillsboro	.1	(*)	.2	.3	.1	—	1.0	1.1	1.4
Merrimack	—	—	(*)	(*)	—	—	1.4	1.4	1.4
Rockingham	—	—	—	—	—	—	1.6	1.6	1.6
Strafford	—	—	—	—	—	—	3.0	3.0	3.0
Sullivan	.4	—	—	.4	—	—	.3	.3	.7
Total	95.4	9.1	3.8	108.3	2.3	—	75.0	77.3	185.6

* Less than 50 cords.

Table 11.— Round pulpwood production in New Jersey, by county and species group, 1964

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Burlington	—	—	17.5	17.5	—	3.9	—	3.9	21.4
Camden	—	—	4.6	4.6	—	7.7	—	7.7	12.3
Gloucester	—	—	6.4	6.4	—	3.8	—	3.8	10.2
Monmouth	—	—	7.5	7.5	—	—	—	—	7.5
Ocean	—	—	5.9	5.9	—	—	—	—	5.9
Total	—	—	41.9	41.9	—	15.4	—	15.4	57.3

[1] Counties with no production are omitted.

Table 12.—Round pulpwood production in New York, by county and species group, 1964

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Albany	—	—	—	—	—	—	2.2	2.2	2.2
Allegany	—	—	0.5	0.5	—	—	1.5	1.5	2.0
Cattaraugus	—	(*)	—	(*)	(*)	—	3.6	3.6	3.6
Chautauqua	—	0.1	—	.1	.1	—	1.9	2.0	2.1
Clinton	6.7	.2	10.0	16.9	3.5	—	25.6	29.1	46.0
Columbia	—	—	—	—	—	—	2.2	2.2	2.2
Cortland	(*)	—	.1	.1	—	—	—	—	.1
Delaware	.3	—	.5	.8	.1	—	1.3	1.4	2.2
Essex	6.4	.3	4.1	10.8	.7	—	44.9	45.6	56.4
Franklin	3.3	.2	1.3	4.8	.7	—	5.5	6.2	11.0
Fulton	1.8	—	—	1.8	.4	—	7.3	7.7	9.5
Genesee	—	—	—	—	—	—	.1	.1	.1
Greene	—	—	—	—	—	—	.1	.1	.1
Hamilton	25.4	1.1	—	26.5	.2	—	14.5	14.7	41.2
Herkimer	.3	.2	(*)	.5	(*)	—	.1	.1	.6
Jefferson	.1	.2	3.0	3.3	.4	—	1.5	1.9	5.2
Lewis	6.4	.8	6.4	13.6	1.8	—	8.7	10.5	24.1
Madison	—	—	.2	.2	—	—	(*)	(*)	.2
Monroe	—	—	.1	.1	—	—	—	—	.1
Montgomery	—	—	—	—	—	—	1.1	1.1	1.1

(CONTINUED)

TABLE 12—CONTINUED

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Niagara	—	—	—	—	—	—	.1	.1	.1
Oneida	3.7	.2	1.2	5.1	.2	—	8.9	9.1	14.2
Onondaga	—	(*)	.3	.3	.1	—	.9	1.0	1.3
Orleans	—	—	—	—	—	—	(*)	(*)	(*)
Oswego	(*)	.1	5.2	5.3	.5	—	3.7	4.2	9.5
Otsego	—	—	1.6	1.6	—	—	4.1	4.1	5.7
Rensselaer	.1	—	—	.1	—	—	9.8	9.8	9.9
St. Lawrence	13.2	1.8	6.8	21.8	8.8	—	3.3	12.1	33.9
Saratoga	.9	1.8	.3	3.0	.7	—	21.9	22.6	25.6
Schenectady	—	(*)	.2	.2	(*)	—	1.5	1.5	1.7
Schoharie	.8	—	—	.8	—	—	2.6	2.6	3.4
Steuben	—	—	.1	.1	—	—	—	—	.1
Warren	2.5	1.9	.4	4.8	.6	—	25.7	26.3	31.1
Washington	.2	.4	.5	1.1	.3	—	18.2	18.5	19.6
Total	72.1	9.2	42.8	124.1	19.1	—	222.9	242.0	366.1

* Less than 50 cords.

[1] Counties with no production are omitted.

Table 1[illegible].—Round pulpwood production in Pennsylvania, by county and species group, 1964

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	0.4	0.4	—	1.8	1.3	3.1	3.5
Bedford	—	0.4	14.3	14.7	—	21.1	21.2	42.3	57.0
Berks	—	—	1.5	1.5	—	—	—	—	1.5
Blair	—	(*)	2.1	2.1	—	8.6	5.9	14.5	16.6
Butler	—	—	—	—	—	(*)	.1	.1	.1
Cambria	—	.7	1.5	2.2	—	5.5	6.2	11.7	13.9
Cameron	—	(*)	—	(*)	—	.4	.6	1.0	1.0
Centre	—	.3	5.3	5.6	.5	34.2	4.5	39.2	44.8
Chester	—	—	(*)	(*)	—	—	—	—	(*)
Clarion	—	(*)	—	(*)	—	1.7	1.4	3.1	3.1
Clearfield	—	3.1	4.2	7.3	.1	36.1	16.5	52.7	60.0
Clinton	—	—	2.2	2.2	(*)	7.5	.4	7.9	10.1
Columbia	—	.2	.7	.9	—	3.5	1.7	5.2	6.1
Crawford	—	.1	—	.1	.1	1.2	13.8	15.1	15.2
Cumberland	—	—	.6	.6	—	4.6	.3	4.9	5.5
Dauphin	—	(*)	.5	.5	—	.8	.3	1.1	1.6
Elk	—	.3	—	.3	.1	.9	42.7	43.7	44.0
Erie	—	.1	—	.1	—	—	3.6	3.6	3.7
Fayette	—	.1	—	.1	—	.9	1.8	2.7	2.8
Forest	—	—	—	—	.5	.6	4.3	5.4	5.4
Franklin	—	—	1.9	1.9	—	8.0	3.6	11.6	13.5

(Continued)

TABLE 13—CONTINUED

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Fulton	—	.1	8.0	8.1	—	8.6	4.6	13.2	21.3
Huntingdon	—	.4	17.5	17.9	—	25.5	11.1	36.6	54.5
Indiana	—	—	—	—	—	.1	.3	.4	.4
Jefferson	—	.1	—	.1	.9	1.7	6.9	9.5	9.6
Juniata	—	.1	2.8	2.9	—	5.1	4.7	9.8	12.7
Lancaster	—	—	(*)	(*)	—	.4	.5	.9	.9
Lebanon	—	—	(*)	(*)	—	—	—	—	(*)
Luzerne	—	.1	.4	.5	—	2.2	1.1	3.3	3.8
Lycoming	—	.1	.9	1.0	.2	2.1	1.9	4.2	5.2
McKean	—	.7	—	.7	.3	.7	45.0	46.0	46.7
Mercer	—	—	—	—	—	.3	.3	.6	.6
Mifflin	—	(*)	.3	.3	—	.2	.1	.3	.6
Montour	—	.1	.5	.6	—	2.6	1.2	3.8	4.4
Northumberland	—	.4	1.4	1.8	—	7.7	3.7	11.4	13.2
Perry	—	.1	5.6	5.7	—	8.6	3.1	11.7	17.4
Potter	—	—	—	—	—	—	1.1	1.1	1.1
Schuylkill	—	—	.7	.7	—	.7	.2	.9	1.6
Snyder	—	.4	2.1	2.5	—	4.6	2.5	7.1	9.6
Somerset	—	(*)	2.6	2.6	—	8.0	8.8	16.8	19.4
Sullivan	—	.1	.2	.3	1.9	1.0	.9	3.8	4.1
Tioga	—	(*)	.2	.2	2.2	—	.3	2.5	2.7
Union	—	.2	.7	.9	—	3.8	1.9	5.7	6.6

Washington	—	—	—	—	—	(*)	.2	.2	.2
Westmoreland	—	—	—	—	—	.3	.3	.6	.6
York	—	—	1.9	1.9	—	3.0	1.7	4.7	6.6
Total	—	8.5	81.0	89.5	7.4	231.4	247.2	486.0	575.5

* Less than 50 cords.

[1] Counties with no production are omitted.

Table 14.—Round pulpwood production in Rhode Island, by county and species group, 1964

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Bristol	—	—	—	—	—	—	—	—	—
Kent	—	—	1.2	1.2	—	2.8	.9	3.7	4.9
Newport	—	—	—	—	—	—	—	—	—
Providence	—	—	2.3	2.3	—	1.0	.4	1.4	3.7
Washington	—	—	.5	.5	—	.7	.4	1.1	1.6
Total	—	—	4.0	4.0	—	4.5	1.7	6.2	10.2

Table 15.—Round pulpwood production in Vermont, by county and species group, 1964

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Addison	3.8	(*)	(*)	3.8	0.5	—	7.2	7.7	11.5
Bennington	1.4	—	—	1.4	.1	—	1.7	1.8	3.2
Caledonia	17.1	.9	.3	18.3	.2	—	1.1	1.3	19.6
Chittenden	3.1	.1	1.7	4.9	.4	—	1.6	2.0	6.9
Essex	39.7	.7	.1	40.5	.8	—	11.8	12.6	53.1
Franklin	8.2	.1	.8	9.1	—	—	.1	.1	9.2
Grand Isle	—	—	.3	.3	—	—	1.4	1.4	1.7
Lamoille	3.2	.2	.1	3.5	(*)	—	.4	.4	3.9
Orange	2.5	.1	.4	3.0	.1	—	.2	.3	3.3
Orleans	8.7	1.0	(*)	9.7	.1	—	.2	.3	10.0
Rutland	4.1	(*)	.1	4.2	1.0	—	2.8	3.8	8.0
Washington	3.5	.7	.1	4.3	.2	—	.9	1.1	5.4
Windham	6.4	.1	(*)	6.5	.1	—	2.0	2.1	8.6
Windsor	4.2	.2	.3	4.7	.3	—	.3	.6	5.3
Total	105.9	4.1	4.2	114.2	3.8	—	31.7	35.5	149.7

* Less than 50 cords.

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Berkeley	—	—	11.6	11.6	—	0.6	0.3	0.9	12.5
Boone	—	—	.1	.1	—	.2	.1	.3	.4
Braxton	—	—	(*)	(*)	—	(*)	(*)	(*)	(*)
Cabell	—	—	3.7	3.7	—	—	—	—	3.7
Calhoun	—	—	.3	.3	—	(*)	(*)	(*)	.3
Clay	—	—	(*)	(*)	—	—	—	—	(*)
Fayette	—	—	.1	.1	—	(*)	(*)	(*)	.1
Gilmer	—	—	—	—	—	.1	(*)	.1	.1
Grant	—	—	4.8	4.8	—	11.5	12.0	23.5	28.3
Greenbrier	—	—	1.7	1.7	—	15.5	15.5	31.0	32.7
Hampshire	—	—	19.5	19.5	—	13.8	13.8	27.6	47.1
Hardy	—	—	10.1	10.1	—	9.2	9.3	18.5	28.6
Harrison	—	—	—	—	—	(*)	(*)	(*)	(*)
Jackson	—	—	1.7	1.7	—	(*)	(*)	(*)	1.7
Jefferson	—	—	.1	.1	—	(*)	(*)	(*)	.1
Kanawha	—	—	.1	.1	—	—	—	—	.1
Lincoln	—	—	(*)	(*)	—	(*)	(*)	(*)	(*)
Mason	—	—	6.4	6.4	—	.7	.5	1.2	7.6
Mineral	—	—	6.0	6.0	—	12.6	13.6	26.2	32.2
Monogalia	—	—	(*)	(*)	—	—	—	—	(*)
Monroe	—	—	5.7	5.7	—	18.2	18.1	36.3	42.0

(CONTINUED)

TABLE 16—CONTINUED

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Morgan	—	—	13.9	13.9	—	3.4	2.4	5.8	19.7
Ohio	—	—	.2	.2	—	(*)	(*)	(*)	.2
Pendleton	—	—	3.4	3.4	—	2.2	2.5	4.7	8.1
Pleasants	—	—	.4	.4	—	(*)	(*)	(*)	.4
Pocahontas	—	—	1.4	1.4	—	5.2	5.3	10.5	11.9
Preston	—	—	(*)	(*)	—	2.0	2.0	4.0	4.0
Putnam	—	—	1.2	1.2	—	(*)	(*)	(*)	1.2
Raleigh	—	—	(*)	(*)	—	.1	.1	.2	.2
Randolph	—	—	.1	.1	—	2.0	2.0	4.0	4.1
Ritchie	—	—	3.1	3.1	—	.4	.4	.8	3.9
Roane	—	—	2.1	2.1	—	—	—	—	2.1
Summers	—	—	(*)	(*)	—	.1	.1	.2	.2
Taylor	—	—	—	—	—	(*)	(*)	(*)	(*)
Tucker	—	—	.2	.2	—	3.7	3.8	7.5	7.7
Wayne	—	—	(*)	(*)	—	—	—	—	(*)
Wirt	—	—	6.0	6.0	—	.3	.3	.6	6.6
Wood	—	—	5.7	5.7	—	.4	.4	.8	6.5
Total	—	—	109.6	109.6	—	102.2	102.5	204.7	314.3

* Less than 50 cords .

[1] Counties with no production are omitted.

Table 17.—Round pulpwood production in the Northeast, by state and by receipts in-state and out-of-state, 1964

(In thousands of rough cords)

State	Total production	Received in-state	Received out-of-state
Connecticut	18.1	(d)	(d)
Delaware	32.0	—	32.0
Maine	2,242.8	2,183.2	59.6
Maryland	151.7	(d)	(d)
Massachusetts	24.9	(d)	(d)
New Hampshire	185.6	148.6	37.0
New Jersey	57.3	57.3	—
New York	366.1	343.9	22.2
Pennsylvania	575.5	522.0	53.5
Rhode Island	10.2	(d)	(d)
Vermont	149.7	25.3	124.4
West Virginia	314.3	—	314.3
Total	4,128.2	3,346.3	728.2

(d) Information withheld to avoid disclosing data for individual mills.

■

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PULPWOOD PRODUCTION in the Northeast 1965

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NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

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PULPWOOD PRODUCTION in the Northeast

1965

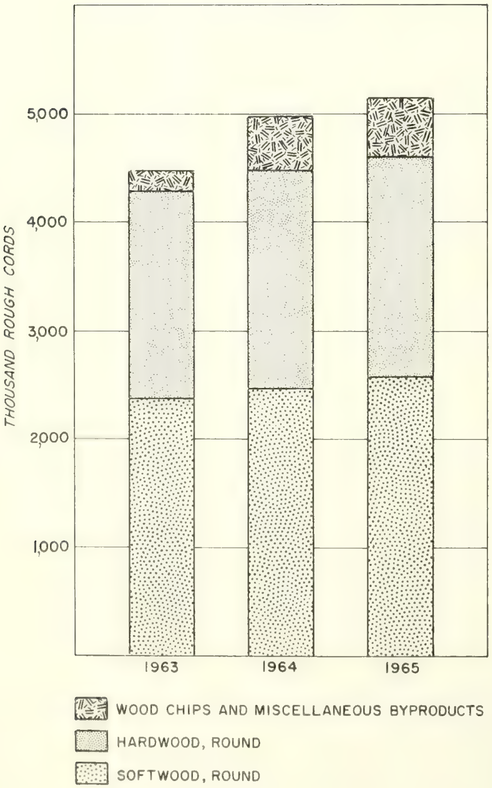


Figure 1. — Total pulpwood production in the 14 states of the Northeast, 1963-65.

Pulpwood Production Tops 5 Million Cords

PULPWOOD production continued to rise in 1965, for the third straight year. Production of all forms of pulpwood in the 14 Northeastern States[1] totaled 5,122,800 cords in 1965. By comparison, the 1964 production of pulpwood for all 14 states amounted to approximately 4,579,000 cords. The 1965 total is a gain of nearly 543,800 cords—12 percent over 1964 production.

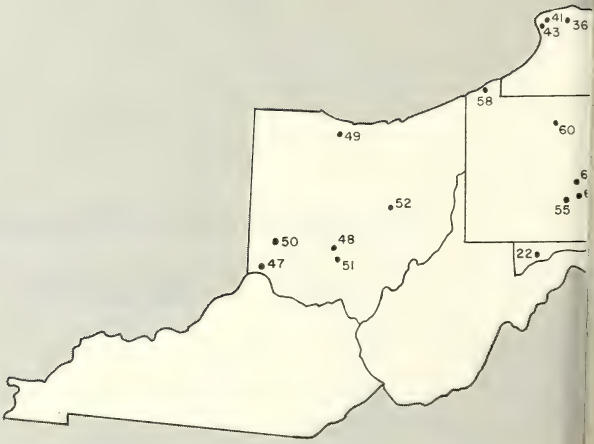
Beginning with this report two additional states—Ohio and Kentucky—have been added to the territory covered in these annual reports of pulpwood production. These states were formerly served by the Central States Forest Experiment Station, and reports of pulpwood production for Ohio and Kentucky were published annually by that Station from 1955 to 1964. Pulpwood production estimates for these states for 1963 and 1964 are reported in Central States Forest Experiment Station Research Notes CS-23 and CS-40.

Figure 1 shows the total pulpwood production in 1963, 1964, and 1965 for all 14 states. Figure 2 shows the location and estimated pulping capacity of the woodpulp mills in this region.

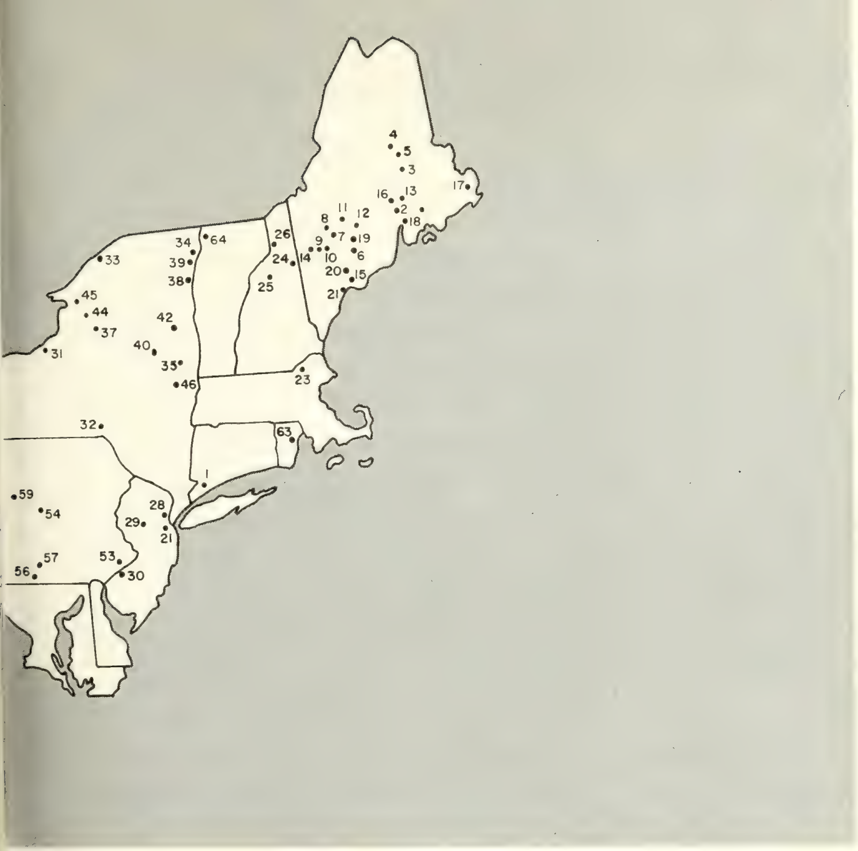
---

[1] Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and West Virginia.

Figure 2.—The active woodpulp mills in the Northeast.



Number	Mill and location	Capacity[1]
		Tons/24 hours
	CONNECTICUT	
1.	Tilo Company, Stratford	30
	MAINE	
2.	Standard Packaging Corp., Eastern Fine Paper and Pulp Division, Brewer	172
3.	Standard Packaging Corp., Eastern Fine Paper and Pulp Division, Lincoln	210
4.	Great Northern Paper Corp., E. Millinocket	970
5.	Great Northern Paper Corp., Millinocket	1,675
6.	Hudson Pulp and Paper Corp., Kennebec Division, Augusta	270
7.	International Paper Corp., Chisholm	320
8.	International Paper Corp., Jay	500
9.	International Paper Corp., Livermore Falls	95
10.	International Paper Corp., Riley	60
11.	Kennebec River Pulp and Paper Co., Madison	170
12.	Keyes Fibre Co., Shawmut	100
13.	Old Town Pulp Products Co., Div. of Lily Tulip Corp., Old Town	([2]/)



14.	Oxford Paper Co., Rumford	670
15.	Pejepscot Paper Co., Brunswick	145
16.	Penobscot Co., Old Town	500
17.	St. Croix Paper Co., Div. of Georgia-Pacific Corp., Woodland	1,010
18.	St. Regis Paper Co., Bucksport	630
19.	Scott Paper Co., Winslow	390
20.	U. S. Gypsum Co., Lisbon Falls	100
21.	S. D. Warren Co., Cumberland Mills	250
	MARYLAND	
22.	West Virginia Pulp and Paper Co., Luke	713
	MASSACHUSETTS	
23.	Oxford Paper Co., Lawrence	50
	NEW HAMPSHIRE	
24.	Brown Co., Berlin	670
25.	Franconia Paper Co., Lincoln	90
26.	Groveton Paper Co., Groveton	270
	NEW JERSEY	
27.	The Phillip Carey Mfg. Co., Perth Amboy	50

CONTINUED

FIGURE 2—CONTINUED

Number	Mill and location	Capacity[1]
		Tons/24 hours
28.	The Flintkote Co., Little Ferry	37
29.	Johns-Manville Products Corp., Manville	200
30.	Ruberoid Co., Gloucester City	192
	NEW YORK	
31.	Armstrong Cork Co., Fulton	260
32.	Allied Chemical Corp., Deposit	([2]/)
33.	Diamond International Corp., Ogdensburg	50
34.	Diamond International Corp., Plattsburg	50
35.	Finch, Pruyn and Co., Glens Falls	120
36.	The Flintkote Co., Lockport	12
37.	Gould Paper Div. of Georgia-Pacific Corp., Lyons Falls	180
38.	Georgia-Pacific Corp., Tissue Products Div., Willsboro	60
39.	Imperial Paper Co., Plattsburg	35
40.	International Paper Co., Corinth	230
41.	International Paper Co., N. Tonawanda	115
42.	International Paper Co., Ticonderoga	155
43.	Kimberly-Clark Corp., Niagara Falls	100
44.	J. P. Lewis Co., Beaver Falls	30
45.	St. Regis Paper Co., Deferiet	320
46.	West Virginia Pulp and Paper Co., Mechanicville	146
	OHIO	
47.	Phillip Carey Mfg. Co., Cincinnati	100
48.	Container Corp. of America, Circleville	160
49.	Johns-Manville Products Co., Avery	55
50.	Logan-Long Co., Franklin	60
51.	Mead Corp., Chillicothe	540
52.	Stone Container Corp., Coshocton	300
	PENNSYLVANIA	
53.	Allied Chemical Corp., Philadelphia	160
54.	Allied Chemical Corp., Sunbury	150
55.	D. M. Bare Co., Roaring Spring	175
56.	Certain-Teed Products Corp., York	([2]/)
57.	P. H. Glatfelter Co., Spring Grove	255
58.	Hammermill Paper Co., Erie	400
59.	Hammermill Paper Co., Lock Haven	([2]/)
60.	New York and Pennsylvania Co., Inc., Johnsonburg	270
61.	West Virginia Pulp and Paper Co., Tyrone	153
62.	West Virginia Pulp and Paper Co., Williamsburg	136
	RHODE ISLAND	
63.	Bird and Sons, Inc., Phillipsdale	250
	VERMONT	
64.	Standard Packaging Corp., Missisiquoi Specialty Board Division	44
	Total, Northeast	15,610

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[1] Source: Lockwood's DIRECTORY OF PAPER AND ALLIED TRADES, 1966, and other sources.

[2] Unknown.

Round Pulpwood

Production of round pulpwood continued on a steady rise, as in the past 2 years. Round pulpwood production in the Northeast rose to 4,590,500 cords in 1965. This increase is a gain of 2.8 percent over the 1964 production. Total receipts of round pulpwood by woodpulp mills in the Northeast totaled 4,893,500 cords. The amount of round pulpwood produced in the Northeast amounted to 94 percent of total receipts. Once again the Northeastern mills received more roundwood than was harvested in the region.

Over Half of Region's Production from Maine

In 1965 Maine again led all the other Northeastern States in round pulpwood production. The round pulpwood harvest in Maine rose 174,600 cords—from 2,242,800 cords in 1964 to 2,417,400 cords in 1965. This total amounted to 53 percent of the regional production in 1965. In 1964, Maine's share of the 14-state production was slightly lower—50 percent. Other top-producing states in 1965 were Pennsylvania with 11 percent of the regional total, New York with 8 percent, West Virginia with 7 percent, and Ohio with 6 percent.

Pennsylvania was the only state among the top five producers to show a decrease from 1964. Pennsylvania harvested 527,500 cords in 1965 compared with 575,500 cords in 1964. However, recent industrial developments in Pennsylvania indicate that this decline in production is of a temporary nature and that Pennsylvania will shortly be increasing its production of round pulpwood at a rate comparable with other top pulpwood-producing states.

New York, West Virginia, and Ohio all showed moderate gains in production. In percentages these changes were: New York up 1 percent; West Virginia up 2 percent; Ohio up 6 percent; Pennsylvania down 8 percent. In all, eight states showed gains over the 1964 production while six states showed decreases.

Seventeen Counties Top 50,000 Cords

In 1965 seventeen counties in the Northeast produced 50,000 or more cords of round pulpwood. Eleven of these counties were in Maine, three in Pennsylvania, and one each in New Hampshire, Maryland, and West Virginia. All these counties, except those in Maryland and West Virginia, exceeded the 50,000-cord mark in 1964 as well as in 1965.

As in the past 2 years, the county with the highest production was Aroostook County, Maine, with 438,700 cords. A change occurred in second place, however, as Penobscot County, Maine, replaced Somerset County, Maine. Penobscot County's production rose by 65,600 cords while Somerset gained only 19,100 cords.

Additions to the list of over-50,000-cord counties are Garrett County, Maryland, and Hampshire County, West Virginia. Garrett County, which produced 44,200 cords in 1964, produced 53,300 cords in 1965. Hampshire County produced 47,100 cords in 1964 and 53,700 cords in 1965. Essex County, Vermont, and Essex County, New York—both of which produced over 50,000 cords in 1964—failed to do so in 1965. Figure 3 shows the level of production for all counties.

Softwood Still Exceeds Hardwood

Softwood species provided 56 percent of the round pulpwood cut in the 14-state area. Five states—Maine, New Hampshire, New York, Vermont, and West Virginia—provided 89 percent of the 2,566,500 cords of softwood cut. Maine alone accounted for 71 percent of all softwood volume. As in the past 2 years, spruce and fir accounted for more than 70 percent of the softwood total.

The other-hardwood group again led the hardwood production with 1,416,600 cords out of 2,024,000. This other-hardwood group includes all hardwood species other than the oaks, hickories, aspens, and yellow-poplar. In the northern part of the region this group is chiefly from the maple-beech-birch forest type. In the southern part of the region it is composed chiefly of the gums, red maple, and other Middle Atlantic hardwood species.

The oak-hickory group accounted for more than the other-hardwood group in six states: Connecticut, Kentucky, Maryland, New Jersey, Ohio, and Pennsylvania.

Wood Chips and Other Byproducts

Upward Trend Continues in use of Wood Chips

Each year shows a substantial increase in the volume of wood chips and other wood-industry residues used by woodpulp mills in the Northeast. Most of this gain is in wood chips produced primarily from sawmill slabs and edgings. Wood-chip production totaled 522,000 cords in 1965.

The two newly added states of Ohio and Kentucky accounted for 50,400 cords of this total. It is impossible to include these states in a regional comparison between 1964 and 1965 production because in earlier reports wood chips and residues were combined as one total for these states.

The 1965 production of chips in the original region of 12 states amounted to the equivalent of 471,600 cords as compared with 370,600 cords in 1964. This is a gain of 101,000 cords over 1964 or 27 percent above the 1964 production. All states except Massachusetts and New York showed significant increases in chip production. Pennsylvania showed the largest gain. Pennsylvania boosted its production 109 percent to 64,700 cords in 1965. Other states with outstanding gains were Vermont, up 58 percent to 36,000 cords; Maine up 42 percent to 129,700 cords; Maryland up 32 percent to 50,300 cords; and West Virginia up 13 percent to 92,400 cords. All of the other states showed significant increases except two, and these showed only slight decreases in chip production.

Use of Other Byproducts Relatively Unchanged

The use for pulpwood of other wood-industry byproducts—such as veneer cores and subquality turning bolts—amounted to 10,300 cords in 1965.

It is not possible to determine how much of this material was produced in Ohio and Kentucky in 1964. However, it is obvious that a decrease has taken place in the other 12 states. The original 12 states produced the equivalent of 8,000 cords in 1965 compared with 10,200 cords in 1964. Maine, which contributed wood-industry byproducts for the first time, was the largest producer, with 5,100 cords. New Hampshire, last year's largest producer, failed to contribute at all in 1965.

Intensity of Pulpwood Harvest

Cutting intensity is an important consideration in any discussion of the production of a particular forest product. It provides a method of relating that production to the timber resource. A common means of expressing cutting intensity is in terms of the volume harvested per acre of commercial forest land. This method provides a handy and quickly understood measure of the harvest intensity. This comparison is shown in table 1.

However, there is one serious drawback to comparing cut to the area of commercial forest land: that is, that this method does

Table 1.—*Round pulpwood production in the Northeast in 1965 compared with area of commercial forest land, by state*

State	Area of[1] commercial forest land 1963	Round pulpwood production 1965	Production per thousand acres of commercial forest land
	Acres	*Cords*	*Cords*
Connecticut	1,973,000	12,700	6
Delaware	391,000	39,600	99
Kentucky	10,840,000	89,100	8
Maine	17,169,000	2,417,200	135
Maryland	2,897,000	154,900	53
Massachusetts	3,259,000	16,500	5
New Hampshire	4,907,000	200,400	40
New Jersey	2,120,000	51,100	24
New York	12,002,000	370,900	31
Ohio	5,121,000	272,500	53
Pennsylvania	15,089,000	527,500	35
Rhode Island	430,000	5,600	13
Vermont	3,713,000	113,000	30
West Virginia	11,389,000	319,300	28
All Northeast	91,300,000	4,590,300	50

[1] Source: Timber Trends in the United States. U. S. Forest Serv. Resource Rep. No. 1 1965; table 3.

Table 2.--Round pulpwood production in the Northeast in 1965 compared with estimated net annual growth of growing stock in the Northeast by state

(In thousands of rough cords)

State	Estimated[1] net annual growth of growing stock	Round pulpwood production	Percent of net annual growth of growing stock cut for pulpwood
	Thousand cords	Thousand cords	Percent
Connecticut	487.1	12.7	2.6
Delaware	212.9	39.6	18.6
Kentucky	4,291.9	89.1	2.0
Maine	6,762.3	2,417.4	35.7
Maryland	1,528.2	154.9	10.1
Massachusetts	611.7	16.5	2.7
New Hampshire	2,215.3	200.4	9.0
New Jersey	596.5	51.1	8.5
New York	4,934.1	370.9	7.5
Ohio	1,823.8	272.5	14.9
Pennsylvania	6,438.8	527.5	8.2
Rhode Island	87.0	5.6	6.4
Vermont	1,621.2	113.0	7.0
West Virginia	6,120.0	319.3	5.2
All Northeast	37,730.8	4,590.5	12.2

[1] Source: TIMBER TRENDS IN THE UNITED STATES. U. S. Forest Serv. Resource Rep. No. 17, 1965; table 25 (converted to cords at 85 cubic feet per cord).

not consider the ability of the forest to replenish the volume that was removed. Perhaps a better method of expressing cutting intensity is to compare the pulpwood harvest with the net annual growth of growing-stock trees. Table 2 shows this method of comparison.

Both methods—cut/area and cut/annual growth—when taken together give a more vivid picture of the intensity of the Northeast's pulpwood harvest.

This analysis of the pulpwood harvest shows that even though Maine is by far the leading pulpwood producer in the Northeast and does have the highest intensity of harvest, Delaware, a relatively minor producer, has the second highest intensity of cut by both measures. And Pennsylvania, the second ranking producer, ranks sixth in intensity of harvest by one method of comparison and seventh by the other.

Conversion Factors Used

Woodpulp mills often find it to their advantage to use different units of measurement in purchasing their pulpwood. Also, pulpwood may be measured differently in different sections of the country simply because of long-standing custom. Thus the 160 cubic-foot cord is sometimes used in the Middle Atlantic States, the cunit is sometimes used in Northern New England and northern New York, and weight is commonly used as a measure in many areas.

In a publication such as this, it is important that all data be compiled by some commonly agreed upon standard unit. This is not only essential in compiling these data but it facilitates comparisons from year to year and comparisons between regions or sections of the country. For these reasons the Forest Service uses a standard 128-cubic-foot cord of rough wood (with bark) as a standard unit of measure.

In compiling these data on pulpwood production it became obvious that a set of conversion factors is necessary. Many authors have developed conversion factors for different species in different regions, but none has developed a set of factors suitable to the entire Northeast and to the groups of species used in these reports. Therefore, through a gleaning of available literature and discussions with persons who have knowledge of local customs and conditions, a set of conversion factors has been developed for use in compiling data for these reports. The estimates of weight per cord were developed by using the weight and moisture relationships provided in table 7 of the *Wood Handbook*[2]. The data presented in this table were modified to arrive at green weight per rough cord and representative species were used for each species group in these tabulations.

The conversions presented here are not intended to be recommended or of an official nature. Any individual user will probably find that in his particular locality these conversions differ substantially from the actual. They are presented here merely to explain the method used in arriving at our estimates and may, if the reader wishes, be used to convert our estimates to a unit that is more commonly used in his particular locality. Also, the reader may consider these conversions as suggested approximations, but to consider them more than this would be quite risky.

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[2] United States Forest Products Laboratory. WOOD HANDBOOK. U. S. Dep. Agr. Handbook 72. 528 pp., illus., 1955.

Roundwood

1. Peeled wood to rough wood basis: 1 cord of peeled roundwood = 1.1765 cords of rough roundwood.

2. Weight: 1 cord of green (100-percent moisture content) rough roundwood at 85 cubic feet of solid wood per cord equals the following for each species group:

	Tons/cord
Spruce and fir	1.8
Hemlock and tamarack	2.0
Pine[3]: North	1.9
South	2.3
Aspen and yellow-poplar	1.9
Oak and hickory	2.8
Other hardwoods	2.6

3. Volume (other than standard cords): (a) 1 unit = 1.25 standard cords; a unit is sometimes referred to as a long cord. (b) 1 cunit (roundwood) = .78 standard cord.

Pulpwood Chips

Volume: 1 cunit of chips = 1.177 cords (at 85 cubic feet of solid wood). (Note: 1 cunit of chips = 100 cubic feet of solid wood.)

Weight:

Softwood, oven-dry:	1 cord (hemlock) = 2,280 pounds = 1.14 tons. 1 ton = 0.88 cord.
Softwood, green:	1 cord (hemlock) = 3,553 pounds = 1.78 tons. 1 ton = 0.56 cord.

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[3] Pine in the northern states (New England and New York) is white pine at 3,702 pounds per cord. In the southern states (Pennsylvania, New Jersey, Ohio, Maryland, Delaware, West Virginia, and Kentucky), shortleaf pine at 4,563 pounds per cord is used as representative of the southern pine group.

Hardwood, oven-dry: 1 cord (red maple) = 2,677 pounds = 1.34 tons.
1 ton = 0.75 cord.
Hardwood, green: 1 cord (red maple) = 4,556 pounds = 2.28 tons.
1 ton = 0.44 cord.

◆

Table 3.—*Round pulpwood in the Northeast, by state and species groups, 1965*
(In thousands of rough cords)

State	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Connecticut	—	—	6.8	6.8	(*)	3.8	2.1	5.9	12.7
Delaware	—	—	39.0	39.0	—	—	.6	.6	39.6
Kentucky	—	—	36.7	36.7	7.5	37.1	7.8	52.4	89.1
Maine	1,549.0	201.7	81.0	1,831.7	31.7	—	554.0	585.7	2,417.4
Maryland	—	—	65.2	65.2	4.3	46.6	38.8	89.7	154.9
Massachusetts	.2	—	4.9	5.1	(*)	2.9	8.5	11.4	16.5
New Hampshire	109.3	10.5	5.5	125.3	2.1	—	73.0	75.1	200.4
New Jersey	—	—	44.7	44.7	—	6.4	—	6.4	51.1
New York	74.6	6.6	50.4	131.6	18.0	19.0	202.3	239.3	370.9
Ohio	—	—	12.2	12.2	1.3	129.6	129.4	260.3	272.5
Pennsylvania	—	2.7	74.5	77.2	4.8	203.1	242.4	450.3	527.5
Rhode Island	—	—	1.7	1.7	—	2.7	1.2	3.9	5.6
Vermont	80.7	3.6	2.7	87.0	2.4	.2	23.4	26.0	113.0
West Virginia	.1	1.2	101.0	102.3	6.7	77.2	133.1	217.0	319.3
Total	1,813.9	226.3	526.3	2,566.5	78.8	528.6	1,416.6	2,024.0	4,590.5

* Less than 50 cords.

Table 4.—*Pulpwood chip production in the Northeast, by state and destination and by softwood and hardwood, 1965*[1]

(In thousands of rough cords)

State	Total production			Received in state			Shipped out of state		
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total
Connecticut	—	—	—	—	—	—	—	—	—
Delaware	—	—	—	—	—	—	—	—	—
Kentucky	0.7	9.1	9.8	—	—	—	0.7	9.1	9.8 (Ohio)
Maine	112.9	16.8	129.7	98.6	16.0	114.6	8.1	.5	8.6 (N. B.)
							6.2	.3	6.5 (N. H.)
Maryland	38.8	11.5	50.3	1.1	—	1.1	23.2	11.5	34.7 (Pa.)
							14.5	—	14.5 (N. J.)
Massachusetts	(*)	7.6	7.6	—	—	—	(*)	7.6	7.6 (N. Y.)
New Hampshire	41.1	9.0	50.1	23.6	8.0	31.6	17.5	1.0	18.5 (Me.)
New Jersey	—	—	—	—	—	—	—	—	—
New York	8.6	32.2	40.8	8.6	23.4	32.0	—	.5	.5 (Pa.)
							—	3.0	3.0 (N. J.)
							—	5.3	5.3 (Ont.)
Ohio	—	40.6	40.6	—	40.6	40.6	—	—	—
Pennsylvania	2.3	62.4	64.7	2.3	62.4	64.7	—	—	—
Rhode Island	—	—	—	—	—	—	—	—	—
Vermont	6.1	29.9	36.0	.2	—	.2	5.5	29.9	35.4 (N. Y.)
							.4	—	.4 (Me.)
West Virginia	.3	92.1	92.4	—	—	—	.1	1.1	1.2 (Md.)
							—	.7	.7 (Pa.)
							—	89.9	89.9 (Ohio)
							.2	.4	.6 (Va.)
Virginia	—	—	—	—	—	—	17.9	—	17.9 (Pa.)
							—	3.0	3.0 (Ohio)
New Brunswick	—	—	—	—	—	—	8.1	1.6	9.7 (Me.)
Quebec	—	—	—	—	—	—	—	.2	.2 (N. Y.)
Total	210.8	311.2	522.0	134.4	150.4	284.8	102.4	165.0	268.0

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[1] The data presented in this table are for pulpwood chips produced by state and do not, therefore, represent the source of raw material for chipping plants (sawmill slabs and edgings), nor do they include wood chips not used in the manufacture of woodpulp.

Table 5.—*Production of miscellaneous-wood industry byproducts used in woodpulp manufacture, by state and destination and by softwood and hardwood, 1965*

(In thousands of rough cords)

State[1]	Total production			Received in state			Shipped out of state		
	Softwood	Hardwood	Total	Softwood	Hardwood	Total	Softwood	Hardwood	Total
Kentucky	—	2.3	2.3	—	—	—	—	2.2	2.2 (Ill.)
								.1	.1 (Ohio)
Maine	5.0	.1	5.1	5.0	0.1	5.1	—	—	—
New Jersey	.4	.4	.8	.4	.4	.8	—	—	—
New York	—	.7	.7	—	.6	.6	—	.1	.1 (Pa.)
Pennsylvania	—	.3	.3	—	—	—	—	.3	.3 (Ill.)
Vermont	(*)	1.1	1.1	—	—	—	(*)	1.1	1.1 (N. Y.)
Total	5.4	4.9	10.3	5.4	1.1	6.5	(*)	3.8	3.8

[1] States with no production are omitted.

* Less than 50 cords.

Table 6.—*Round pulpwood imported from outside the territory, 1965*
(In thousands of rough cords)

Producing state or province	Maryland	Maine	New Hampshire	New York	Ohio	Pennsylvania	Total received
Indiana:							
Softwood	0.1	—	—	—	—	—	0.1
Hardwood	—	—	—	—	5.3	—	5.3
Total	0.1	—	—	—	5.3	—	5.4
Virginia:							
Softwood	—	—	—	—	—	41.0	41.0
Hardwood	—	—	—	—	—	.1	.1
Total	—	—	—	—	—	41.1	41.1
Total, U. S.:							
Softwood	.1	—	—	—	—	41.1	41.1
Hardwood	—	—	—	—	5.3	.1	5.4
Total	0.1	—	—	—	5.3	41.2	46.5
New Brunswick:							
Softwood	—	209.0	—	—	—	—	209.0
Hardwood	—	4.8	—	—	—	—	4.8
Total	—	213.8	—	—	—	—	213.8
Ontario:							
Softwood	—	—	—	34.7	—	6.36	98.3
Hardwood	—	—	—	24.6	—	—	24.6
Total	—	—	—	59.3	—	63.6	122.9
Quebec:							
Softwood	—	6.1	20.4	64.6	—	—	91.1
Hardwood	—	1.7	27.0	8.9	—	—	37.6
Total	—	7.8	47.4	73.5	—	—	128.7
Total, Canada:							
Softwood	—	215.1	20.4	99.3	—	63.6	398.4
Hardwood	—	6.5	27.0	33.5	—	—	67.0
Total	—	221.6	47.4	132.8	—	63.6	465.4

Total, U. S. & Canada:							
Softwood	0.1	215.1	20.4	99.3	—	104.6	439.6
Hardwood	—	6.5	27.0	33.5	5.3	0.1	72.3
Total	0.1	221.6	47.4	132.8	5.3	104.7	511.9

Table 7.—*Round pulpwood production in Connecticut, by county and species group, 1965*

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Fairfield	—	—	2.7	2.7	—	—	—	—	2.7
Hartford	—	—	—	—	—	—	—	—	—
Litchfield	—	—	—	—	(*)	—	—	—	(*)
Middlesex	—	—	—	—	—	—	—	—	—
New Haven	—	—	2.8	2.8	—	—	—	—	2.8
New London	—	—	.3	.3	—	0.6	0.2	0.8	1.1
Tolland	—	—	.2	.2	—	.3	.1	.4	.6
Windham	—	—	.8	.8	—	2.9	1.8	4.7	5.5
Total	—	—	6.8	6.8	(*)	3.8	2.1	5.9	12.7

*Less than 50 rough cords.

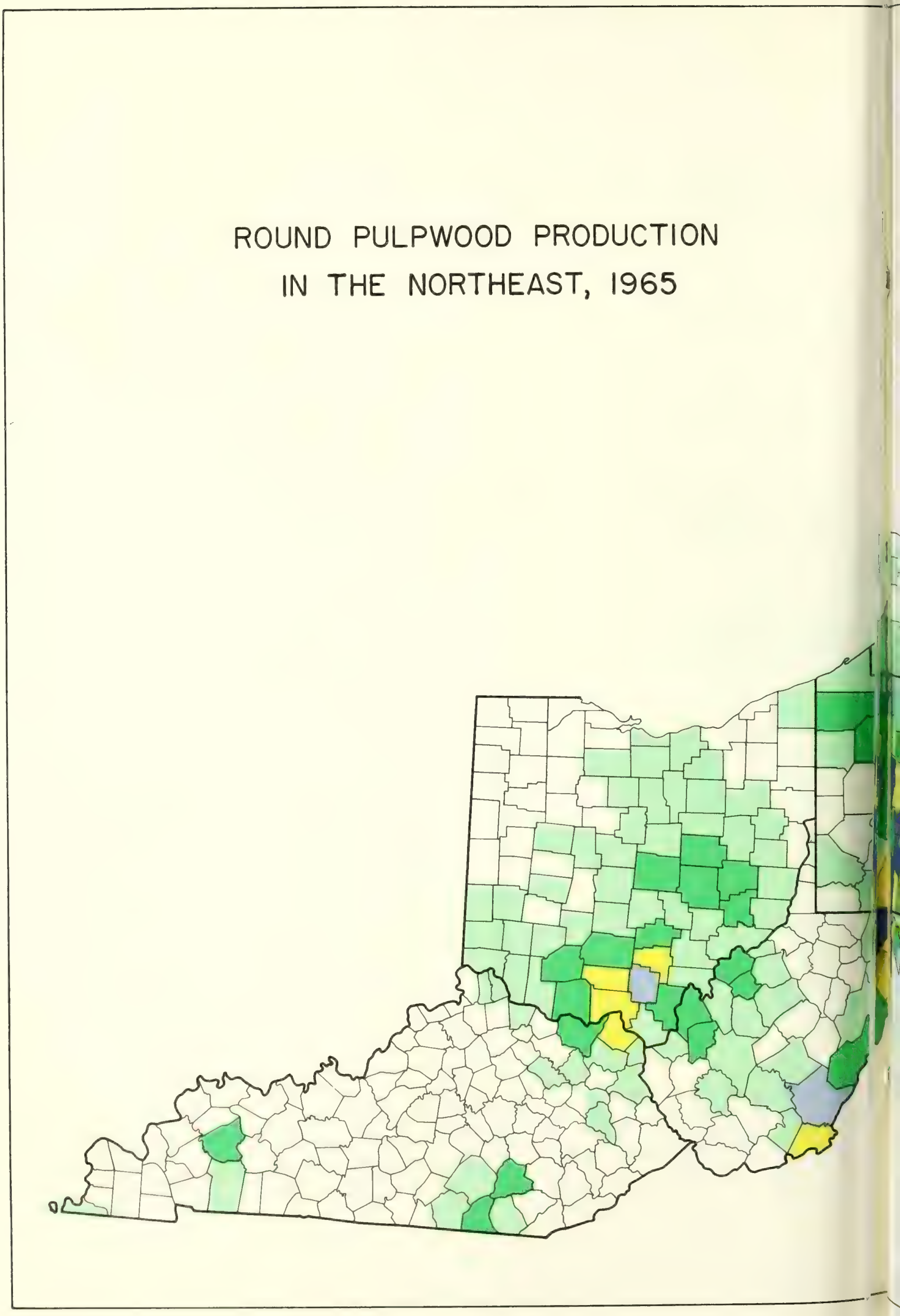

Figure 3.—The geographical pattern of round pulpwood production the Northeast in 1965.

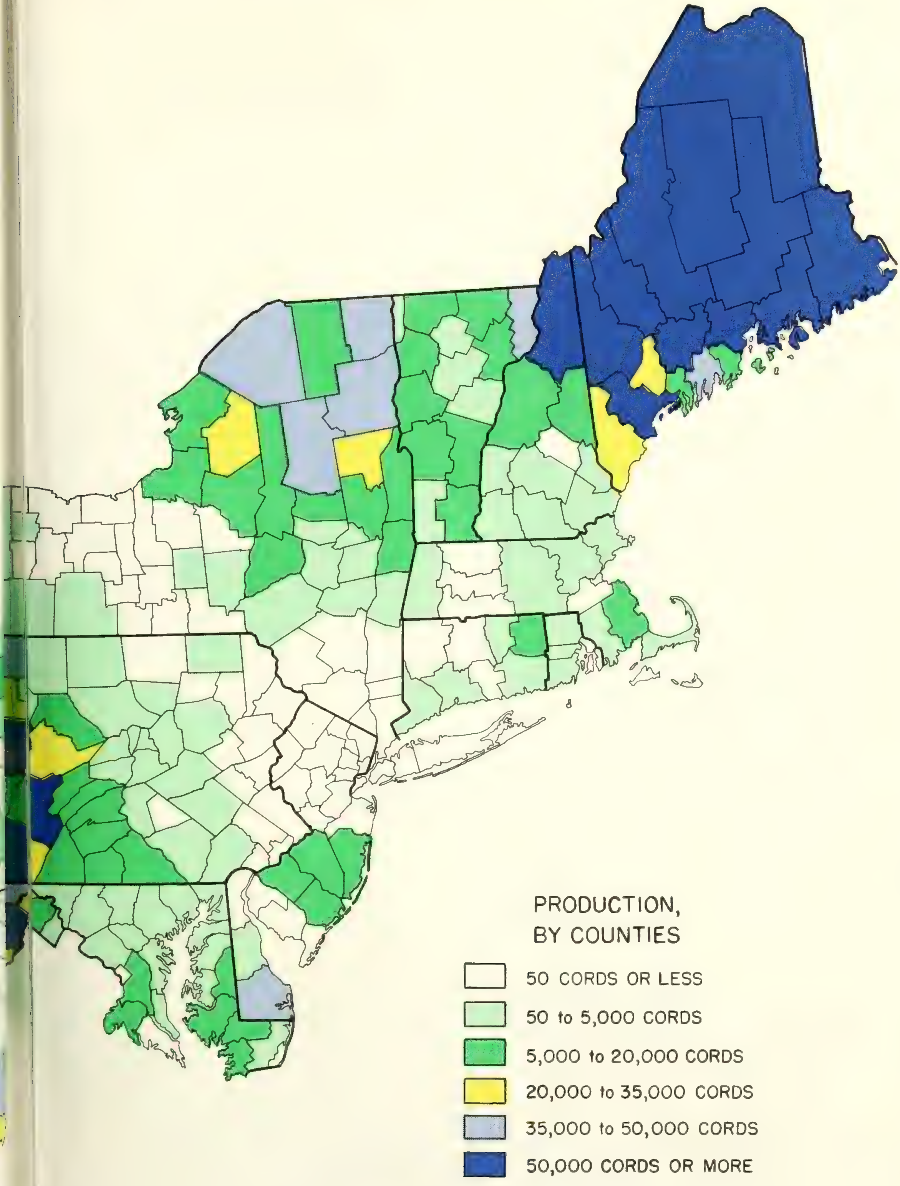
PRODUCTION,
BY COUNTIES
50 CORDS OR LESS
50 to 5,000 CORDS
5,000 to 20,000 CORDS
20,000 to 35,000 CORDS
35,000 to 50,000 CORDS
50,000 CORDS OR MORE

Table 8.—*Round pulpwood production in Delaware, by county and species group, 1965*
(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Kent	—	—	1.2	1.2	—	—	—	—	1.2
Newcastle	—	—	—	—	—	—	—	—	—
Sussex	—	—	37.8	38.8	—	—	0.6	0.6	38.4
Total	—	—	39.0	39.0	—	—	0.6	0.6	39.6

Table 9.—*Round pulpwood production in Kentucky, by county and species group, 1965*

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Bath	—	—	2.5	2.5	0.1	0.1	(*)	0.2	2.7
Boyd	—	—	1.3	1.3	.2	—	0.3	.5	1.8
Bracken	—	—	—	—	—	—	.1	.1	.1
Campbell	—	—	—	—	—	—	.1	.1	.1
Carter	—	—	.8	.8	(*)	3.0	(*)	3.0	3.8
Christian	—	—	1.6	1.6	—	—	—	—	1.6
Fleming	—	—	(*)	(*)	—	—	—	—	(*)
Fulton	—	—	—	—	.1	—	.1	.2	.2
Grant	—	—	—	—	—	—	(*)	(*)	(*)
Greenup	—	—	—	—	.1	20.7	2.1	22.9	22.9
Hopkins	—	—	—	—	3.1	—	3.1	6.2	6.2
Kenton	—	—	—	—	—	(*)	.1	.1	.1
Laurel	—	—	8.0	8.0	.6	3.0	.7	4.3	12.3
Lawrence	—	—	.5	.5	—	—	—	—	.5
Lewis	—	—	—	—	—	5.9	—	5.9	5.9
McCreary	—	—	6.9	6.9	2.3	.2	.1	2.6	9.5
Magoffin	—	—	—	—	—	—	.1	.1	.1
Pulaski	—	—	1.3	1.3	—	—	—	—	1.3
Rowan	—	—	3.0	3.0	—	—	—	—	3.0
Wayne	—	—	2.2	2.2	—	—	—	—	2.2
Whitley	—	—	8.6	8.6	1.0	4.2	1.0	6.2	14.8
Total	—	—	36.7	36.7	7.5	37.1	7.8	52.4	89.1

* Less than 50 cords.

[1] Counties with no production are omitted.

Table 10.—*Round pulpwood production in Maine, by county and species group, 1965*

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Androscoggin	3.9	3.6	10.8	18.3	—	—	14.0	14.0	32.3
Aroostook	380.1	12.4	—	392.5	19.5	—	26.7	46.2	438.7
Cumberland	7.3	2.0	12.8	22.1	—	—	29.6	29.6	51.7
Franklin	65.4	5.9	5.3	76.6	—	—	42.7	42.7	119.3
Hancock	40.8	15.1	.7	56.6	—	—	11.0	11.0	67.6
Kennebec	14.3	7.8	13.0	35.1	—	—	39.9	39.9	75.0
Knox	12.1	2.4	.5	15.0	—	—	4.1	4.1	19.1
Lincoln	24.3	2.4	5.9	32.6	—	—	12.4	12.4	45.0
Oxford	54.6	15.5	14.7	84.8	.2	—	126.8	127.0	211.8
Penobscot	251.7	57.1	2.1	310.9	6.1	—	102.0	108.1	419.0
Piscataquis	193.6	20.0	.5	214.5	5.8	—	28.7	34.5	248.6
Sagadahoc	4.9	2.4	7.2	14.5	—	—	5.2	5.2	19.7
Somerset	310.9	14.5	1.6	327.0	—	—	54.5	54.5	381.5
Waldo	27.1	4.6	.5	32.2	—	—	39.1	39.1	71.3
Washington	157.4	36.0	.2	193.6	.1	—	2.8	2.9	196.5
York	.6	(*)	5.2	5.8	—	—	14.5	14.5	20.3
Total	1,549.0	201.7	81.0	1,831.7	31.7	—	554.0	585.7	2,417.4

*Less than 50 cords.

Table 11.—*Round pulpwood production in Maryland, by county and species group, 1965*

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Allegany	—	—	4.8	4.8	1.7	17.3	15.4	34.4	39.2
Ann Arundel	—	—	4.0	4.0	—	.1	—	.1	4.1
Baltimore	—	—	(*)	(*)	—	.1	—	.1	.1
Calvert	—	—	.9	.9	—	—	—	—	.9
Caroline	—	—	5.9	5.9	—	.6	—	.6	6.5
Carroll	—	—	(*)	(*)	—	(*)	—	(*)	(*)
Cecil	—	—	.1	.1	—	.1	—	.1	.2
Charles	—	—	9.0	9.0	—	—	—	—	9.0
Dorchester	—	—	9.1	9.1	—	—	—	—	9.1
Frederick	—	—	(*)	(*)	—	.2	—	.2	.2
Garrett	—	—	1.2	1.2	2.6	26.1	23.4	52.1	53.3
Harford	—	—	(*)	(*)	—	.1	—	.1	.1
Howard	—	—	.1	.1	—	(*)	—	(*)	.1
Kent	—	—	.6	.6	—	—	—	—	.6
Montgomery	—	—	.7	.7	—	—	—	—	.7
Prince Georges	—	—	5.1	5.1	(*)	.1	(*)	.1	5.2
Queen Annes	—	—	.3	.3	—	—	—	—	.3
Saint Marys	—	—	—	—	—	—	—	—	—
Somerset	—	—	5.5	5.5	—	(*)	(*)	(*)	5.5
Talbot	—	—	.1	.1	—	—	—	—	.1
Washington	—	—	.6	.6	(*)	1.9	(*)	1.9	2.5
Wicomico	—	—	13.3	13.3	—	—	—	—	13.3
Worcester	—	—	3.9	3.9	—	—	—	—	3.9
Total	—	—	65.2	65.2	4.3	46.6	38.8	89.7	154.9

* Less than 50 cords.

Table 12.—*Round pulpwood production in Massachusetts, by county and species groups, 1965*
(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Barnstable	—	—	0.1	0.1	—	—	—	—	0.1
Berkshire	0.2	—	—	0.2	(*)	0.1	1.8	1.9	2.1
Bristol	—	—	1.1	1.1	—	0.7	0.9	1.6	2.7
Essex	—	—	—	—	—	—	1.9	1.9	1.9
Middlesex	—	—	—	—	—	—	0.5	0.5	0.5
Plymouth	—	—	3.7	3.7	—	2.1	2.5	4.6	8.3
Worcester	—	—	—	—	—	—	0.9	0.9	0.9
Total	0.2	—	4.9	5.1	(*)	2.9	8.5	11.4	16.5

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 13.—*Round pulpwood production in New Hampshire, by county and species group, 1965*

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Belknap	—	(*)	—	(*)	—	—	(*)	(*)	(*)
Carroll	2.9	0.1	0.3	3.3	—	—	9.1	9.1	12.4
Cheshire	0.1	(*)	(*)	0.1	—	—	0.8	0.8	0.9
Coos	98.5	9.2	2.9	110.6	2.1	—	51.2	53.3	163.9
Grafton	7.5	1.2	2.0	10.7	(*)	—	2.8	2.8	13.5
Hillsboro	(*)	(*)	0.1	0.1	(*)	—	1.1	1.1	1.2
Merrimack	(*)	—	—	(*)	(*)	—	2.4	2.4	2.4
Rockingham	—	—	—	—	—	—	1.0	1.0	1.0
Strafford	—	—	—	—	—	—	4.2	4.2	4.2
Sullivan	0.3	—	0.2	0.5	—	—	0.4	0.4	0.9
Total	109.3	10.5	5.5	125.3	2.1	—	73.0	75.1	200.4

* Less than 50 cords.

Table 14.—*Round pulpwood production in New Jersey, by county and species groups, 1965*
(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Atlantic	—	—	7.5	7.5	—	—	—	—	7.5
Burlington	—	—	17.9	17.9	—	1.6	—	1.6	19.5
Camden	—	—	6.0	6.0	—	3.2	—	3.2	9.2
Gloucester	—	—	6.6	6.6	—	1.6	—	1.6	8.2
Ocean	—	—	6.7	6.7	—	—	—	—	6.7
Total	—	—	44.7	44.7	—	6.4	—	6.4	51.1

[1] Counties with no production are omitted.

Table 15.—*Round pulpwood production in New York, by county and species groups, 1965*
(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Albany	—	—	—	—	(*)	0.2	2.3	2.5	2.5
Allegany	—	—	0.6	0.6	—	—	1.2	1.2	1.8
Cattaraugus	—	—	—	—	—	—	2.4	2.4	2.4
Cayuga	—	—	(*)	(*)	—	—	—	—	(*)
Chatauqua	—	—	0.3	0.3	—	—	1.8	1.8	2.1
Clinton	0.3	—	—	0.3	—	—	—	—	0.3

Columbia	—	—	—	—	(*)	0.1	1.5	1.6	1.6
Cortland	—	—	1.1	1.1	—	—	—	—	1.1
Delaware	0.2	—	0.6	0.8	—	0.1	1.3	1.4	2.2
Erie	—	—	—	—	—	—	0.1	0.1	0.1
Essex	12.4	0.4	2.6	15.4	0.8	0.2	23.9	24.9	40.3
Franklin	5.0	0.7	0.9	6.6	0.8	7.3	—	8.1	14.7
Fulton	2.4	(*)	(*)	2.4	0.3	0.7	7.6	8.6	11.0
Genesee	—	—	—	—	—	—	0.3	0.3	0.3
Greene	(*)	—	—	(*)	—	0.3	3.0	3.3	3.3
Hamilton	15.1	(*)	—	15.1	2.4	0.2	32.2	34.8	49.9
Herkimer	5.5	0.2	0.3	6.0	0.1	—	0.8	0.9	6.9
Jefferson	0.3	0.4	2.0	2.7	0.2	—	4.2	4.4	7.1
Lewis	6.8	0.7	7.1	14.6	1.6	—	7.6	0.2	23.8
Montgomery	(*)	0.1	—	0.1	—	0.3	2.6	2.9	3.0
Niagara	—	—	—	—	—	—	0.6	0.6	0.6
Oneida	2.0	0.3	3.1	5.4	(*)	—	2.9	2.9	8.3
Orleans	—	—	—	—	—	—	(*)	(*)	(*)
Oswego	(*)	0.2	3.6	3.8	1.2	—	10.6	11.8	15.6
Otsego	0.2	—	3.9	4.1	—	0.1	1.0	1.1	5.2
Rensselaer	0.1	—	—	0.1	0.1	0.8	8.4	9.3	9.4
St. Lawrence	16.2	2.5	7.5	26.2	5.4	—	11.7	17.1	43.2
Saratoga	0.3	—	0.7	1.0	0.5	1.6	13.0	15.1	16.1
Schenectady	—	—	—	—	(*)	0.2	2.0	2.2	2.2
Schoharie	0.3	—	—	0.3	—	0.2	2.7	2.9	3.2
Seneca	—	—	—	—	—	—	(*)	(*)	(*)
Steuben	—	—	0.1	0.1	—	—	—	—	0.1
Tompkins	—	—	(*)	(*)	—	—	—	—	(*)
Warren	1.0	0.2	0.5	1.7	0.7	3.9	26.1	30.7	32.4
Washington	(*)	0.1	0.3	0.4	0.5	2.8	15.8	19.1	19.5
Total	74.6	6.6	50.4	131.6	18.0	19.0	202.3	239.3	370.9

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*Less than 50 cords.

[1] Counties with no production are omitted.

Table 16.—*Round pulpwood production in Ohio, by county and species groups, 1965*
(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	0.1	0.1	0.2	2.8	2.8	5.8	5.9
Ashland	—	—	0.1	0.1	—	—	1.0	1.0	1.1
Ashtabula	—	—	—	—	—	—	0.4	0.4	0.4
Athens	—	—	1.5	1.5	(*)	0.1	2.9	3.0	4.5
Belmont	—	—	—	—	—	—	0.2	0.2	0.2
Brown	—	—	(*)	(*)	(*)	0.5	1.1	1.6	1.6
Butler	—	—	(*)	(*)	0.1	0.1	0.3	0.5	0.5
Carroll	—	—	—	—	—	—	0.1	0.1	0.1
Champaign	—	—	—	—	—	—	(*)	(*)	(*)
Clark	—	—	(*)	(*)	0.1	0.3	1.6	2.0	2.0
Clermont	—	—	—	—	(*)	0.3	0.6	0.9	0.9
Clinton	—	—	—	—	(*)	0.7	0.8	1.5	1.5
Coshocton	—	—	—	—	—	—	17.9	17.9	17.9
Crawford	—	—	—	—	—	0.1	0.3	0.4	0.4
Delaware	—	—	—	—	—	—	0.4	0.4	0.4
Erie	—	—	—	—	—	1.5	1.3	2.8	2.8
Fairfield	—	—	—	—	—	—	1.1	1.1	1.1
Fayette	—	—	—	—	—	—	0.1	0.1	0.1
Franklin	—	—	—	—	—	—	0.4	0.4	0.4
Gallia	—	—	5.8	5.8	(*)	4.8	0.3	5.1	10.9
Guernsey	—	—	(*)	(*)	—	—	6.1	6.1	6.1
Hamilton	—	—	—	—	(*)	0.2	1.2	1.4	1.4
Harrison	—	—	—	—	—	—	0.3	0.3	0.3
Highland	—	—	(*)	(*)	0.2	2.2	3.1	5.5	5.5
Hocking	—	—	0.2	0.2	—	0.9	11.7	12.6	12.8
Holmes	—	—	—	—	—	—	2.2	2.2	2.2
Huron	—	—	—	—	—	0.7	1.3	2.0	2.0
Jackson	—	—	0.4	0.4	—	38.7	2.8	41.5	41.9

Lawrence	—	—	0.4	0.4	—	0.6	0.3	0.9	1.3
Licking	—	—	(*)	(*)	—	—	7.2	7.2	7.2
Logan	—	—	0.1	0.1	—	—	0.1	0.1	0.2
Lorain	—	—	—	—	—	0.1	(*)	0.1	0.1
Madison	—	—	—	—	—	—	(*)	(*)	(*)
Medina	—	—	—	—	—	—	0.1	0.1	0.1
Meigs	—	—	3.4	3.4	(*)	0.5	0.4	0.9	4.3
Miami	—	—	—	—	(*)	—	(*)	(*)	(*)
Monroe	—	—	—	—	—	—	0.4	0.4	0.4
Montgomery	—	—	(*)	(*)	0.2	0.4	1.2	1.8	1.8
Morgan	—	—	—	—	—	—	1.4	1.4	1.4
Morrow	—	—	—	—	—	—	0.2	0.2	0.2
Muskingum	—	—	(*)	(*)	—	—	9.6	9.6	9.6
Noble	—	—	—	—	—	—	5.9	5.9	5.9
Perry	—	—	—	—	—	—	1.3	1.3	1.3
Pickaway	—	—	—	—	—	—	1.3	1.3	1.3
Pike	—	—	(*)	(*)	0.2	20.8	6.4	27.4	27.4
Preble	—	—	(*)	(*)	0.1	0.6	2.0	2.7	2.7
Richland	—	—	—	—	—	—	0.1	0.1	0.1
Ross	—	—	(*)	(*)	0.1	12.9	3.1	16.1	16.1
Scioto	—	—	0.1	0.1	—	24.6	4.1	28.7	28.8
Seneca	—	—	—	—	—	(*)	0.1	0.1	0.1
Stark	—	—	—	—	—	—	0.4	0.4	0.4
Tuscarawas	—	—	—	—	—	—	2.7	2.7	2.7
Union	—	—	—	—	—	—	0.3	0.3	0.3
Vinton	—	—	(*)	(*)	—	14.8	11.0	25.8	25.8
Warren	—	—	(*)	(*)	0.1	0.4	1.2	1.7	1.7
Washington	—	—	0.1	0.1	—	(*)	3.6	3.6	3.7
Wayne	—	—	—	—	—	—	0.4	0.4	0.4
Wyandot	—	—	—	—	—	—	(*)	(*)	(*)
Total	—	—	12.2	12.2	1.3	129.6	129.4	260.3	272.5

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[1] Counties with no production are omitted.
* Less than 50 cords.

Table 17.—*Round pulpwood production in Pennsylvania, by county and species groups, 1965*

(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Adams	—	—	0.4	0.4	—	4.2	1.9	6.1	6.5
Allegany	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Armstrong	—	—	—	—	—	0.2	0.7	0.9	0.9
Bedford	—	0.1	11.9	12.0	1.2	22.0	19.5	42.7	54.7
Berks	—	—	0.6	0.6	—	—	—	—	0.6
Blair	—	(*)	2.1	2.1	—	7.1	5.9	13.0	15.1
Bradford	—	—	(*)	(*)	(*)	—	—	(*)	(*)
Cambria	—	0.1	2.1	2.2	—	4.6	5.4	10.0	12.2
Cameron	—	—	—	—	—	0.3	2.3	2.6	2.6
Centre	—	0.4	2.5	2.9	—	23.2	8.8	32.0	34.9
Chester	—	—	0.1	0.1	—	(*)	—	(*)	0.1
Clarion	—	—	—	—	0.2	.8	0.7	1.7	1.7
Clearfield	—	0.6	5.3	5.9	0.1	35.9	22.6	58.6	64.5
Clinton	—	(*)	0.7	0.7	0.4	6.1	3.1	9.6	10.3
Columbia	—	(*)	0.1	0.1	(*)	0.3	0.1	0.4	0.5
Crawford	—	0.1	—	0.1	—	0.8	9.0	9.8	9.9
Cumberland	—	—	0.5	0.5	—	3.7	1.6	5.3	5.8
Dauphin	—	(*)	0.2	0.2	(*)	0.2	0.1	0.3	0.5
Elk	—	0.2	0.1	0.3	—	1.0	28.2	29.2	29.5
Erie	—	(*)	—	(*)	—	—	3.8	3.8	3.8
Fayette	—	—	(*)	(*)	0.1	1.2	1.9	3.2	3.2
Forest	—	—	—	—	—	1.9	9.0	10.9	10.9
Franklin	—	—	1.5	1.5	(*)	9.8	3.2	13.0	14.5
Fulton	—	0.1	9.1	9.2	0.1	9.9	5.1	15.1	24.3
Huntingdon	—	0.7	19.1	19.8	(*)	26.8	18.1	44.9	64.7

Indiana	—	(*)	4.0	4.0	—	1.1	1.4	2.5	6.5
Jefferson	—	(*)	—	(*)	0.8	1.1	6.1	8.0	8.0
Juniata	—	0.1	3.3	3.4	(*)	4.0	1.9	5.9	9.3
Lancaster	—	—	0.2	0.2	—	0.5	0.6	1.1	1.3
Luzerne	—	(*)	0.1	0.1	(*)	0.2	0.1	0.3	0.4
Lycoming	—	(*)	0.3	0.3	0.4	0.3	0.9	1.6	1.9
McKean	—	0.2	—	0.2	0.1	(*)	38.2	38.3	38.5
Mercer	—	—	—	—	—	0.4	0.3	0.7	0.7
Mifflin	—	0.1	2.5	2.6	—	4.3	1.7	6.0	8.6
Montour	—	(*)	(*)	(*)	(*)	0.2	0.1	0.3	0.3
Northumberland	—	(*)	0.1	0.1	(*)	0.6	0.2	0.8	0.9
Perry	—	(*)	2.0	2.0	(*)	4.6	2.3	6.9	8.9
Potter	—	(*)	(*)	(*)	(*)	—	2.4	2.4	2.4
Schuylkill	—	(*)	1.9	1.9	(*)	1.7	0.8	2.5	4.4
Snyder	—	(*)	0.6	0.6	(*)	1.0	0.3	1.3	1.9
Somerset	—	(*)	1.9	1.9	0.8	12.0	14.5	27.3	29.2
Sullivan	—	—	—	—	—	—	2.1	2.1	2.1
Susquehanna	—	—	—	—	0.1	—	(*)	0.1	0.1
Tioga	—	(*)	0.3	0.3	—	—	2.3	2.3	2.6
Union	—	(*)	0.1	0.1	(*)	0.4	0.1	0.5	0.6
Venango	—	—	—	—	0.3	5.8	5.4	11.5	11.5
Warren	—	(*)	—	(*)	0.2	0.7	7.6	8.5	8.5
Washington	—	—	—	—	—	(*)	0.1	0.1	0.1
Westmoreland	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Wyoming	—	—	—	—	(*)	—	—	(*)	(*)
York	—	—	0.9	0.9	—	4.2	2.0	6.2	7.1
Total	—	2.7	74.5	77.2	4.8	203.1	242.4	450.3	527.5

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 18.—*Round pulpwood production in Rhode Island, by county and species groups, 1965*

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Bristol	—	—	—	—	—	—	—	—	—
Kent	—	—	0.5	0.5	—	1.7	0.6	2.3	2.8
Newport	—	—	—	—	—	—	—	—	—
Providence	—	—	1.0	1.0	—	0.6	0.3	0.9	1.9
Washington	—	—	0.2	0.2	—	0.4	0.3	0.7	0.9
Total	—	—	1.7	1.7	—	2.7	1.2	3.9	5.6

Table 19.—*Round pulpwood production in Vermont, by county and species group, 1965*

(In thousands of rough cords)

County	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Addison	3.4	0.1	0.1	3.6	0.2	—	2.2	2.4	6.0
Bennington	1.1	—	—	1.1	0.1	(*)	1.1	1.2	2.3
Caledonia	13.3	1.7	0.9	15.9	(*)	—	0.7	0.7	16.6
Chittenden	4.1	—	1.0	5.1	0.3	—	2.1	2.4	7.5
Essex	24.7	0.3	0.2	25.2	0.4	—	10.3	10.7	35.9
Franklin	6.9	0.1	(*)	7.0	(*)	—	0.1	0.1	7.1
Grand Isle	—	—	—	—	—	—	1.4	1.4	1.4
Lamoille	3.2	0.2	—	3.4	(*)	—	0.3	0.3	3.7
Orange	0.6	0.1	0.3	1.0	(*)	—	0.1	0.1	1.1
Orleans	6.5	0.7	0.1	7.3	(*)	—	—	(*)	7.3
Rutland	4.2	(*)	(*)	4.2	0.4	0.2	2.5	3.1	7.3
Washington	1.3	0.2	(*)	1.5	0.1	—	1.4	1.5	3.0
Windham	6.6	(*)	0.1	6.7	0.6	(*)	0.7	1.3	8.0
Windsor	4.8	0.2	—	5.0	0.3	—	0.5	0.8	5.8
Total	80.7	3.6	2.7	87.0	2.4	0.2	23.4	26.0	113.0

* Less than 50 cords.

Table 20.—*Round pulpwood production in West Virginia, by county and species group, 1965*
(In thousands of rough cords)

County[1]	Softwood				Hardwood				All species
	Spruce and fir	Hemlock and tamarack	Pine	Total	Aspen and yellow-poplar	Oak and hickory	Other hardwoods	Total	
Berkeley	—	—	9.2	9.2	—	2.1	0.3	2.4	11.6
Boone	—	(*)	(*)	(*)	(*)	(*)	0.5	0.5	0.5
Braxton	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Cabell	—	—	0.3	0.3	—	—	—	—	0.3
Calhoun	—	—	0.2	0.2	—	(*)	(*)	(*)	0.2
Doddridge	—	—	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Fayette	—	—	(*)	(*)	(*)	(*)	0.2	0.2	0.2
Gilmer	—	—	(*)	(*)	(*)	0.1	(*)	0.1	0.1
Grant	—	—	4.3	4.3	1.3	12.1	11.0	24.4	28.7
Greenbrier	(*)	0.5	2.5	3.0	0.4	1.4	32.0	33.8	36.8
Hampshire	—	—	20.6	20.6	1.6	16.7	14.8	33.1	53.7
Hancock	—	—	—	—	—	(*)	(*)	(*)	(*)
Hardy	—	—	10.0	10.0	0.1	10.6	10.5	21.2	31.2
Harrison	—	—	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Jackson	—	—	1.3	1.3	(*)	0.1	0.2	0.3	1.6
Jefferson	—	—	0.2	0.2	(*)	0.1	0.1	0.2	0.4
Kanawha	—	—	0.1	0.1	—	(*)	(*)	(*)	0.1
Lewis	—	—	(*)	(*)	—	—	—	—	(*)
Lincoln	—	—	(*)	(*)	—	—	—	—	(*)
Marshall	—	—	(*)	(*)	—	—	—	—	(*)
Mason	—	—	6.8	6.8	0.1	0.6	1.2	1.9	8.7
Mineral	—	—	5.5	5.5	1.4	13.9	12.6	27.9	33.4

Monongalia	—	—	(*)	(*)	—	—	—	—	(*)
Monroe	0.1	0.6	3.3	4.0	0.5	1.2	28.6	30.3	34.3
Morgan	—	—	13.2	13.2	0.1	5.7	1.4	7.2	20.4
Nicholas	—	—	0.1	0.1	(*)	0.3	0.2	0.5	0.6
Ohio	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Pendleton	—	(*)	3.7	3.7	0.3	2.7	3.8	6.8	10.5
Pleasants	—	—	0.2	0.2	(*)	(*)	(*)	(*)	0.2
Pocahontas	(*)	0.1	1.3	1.4	0.4	3.4	8.6	12.4	13.8
Preston	—	—	—	—	0.2	1.8	1.6	3.6	3.6
Putnam	—	—	5.6	5.6	(*)	(*)	(*)	(*)	5.6
Raleigh	—	—	—	—	—	(*)	(*)	(*)	(*)
Randolph	—	—	0.1	0.1	0.1	1.1	1.0	2.2	2.3
Ritchie	—	—	1.7	1.7	(*)	0.2	0.2	0.4	2.1
Roane	—	—	1.2	1.2	—	0.1	0.1	0.2	1.4
Summers	(*)	(*)	0.1	0.1	(*)	(*)	0.8	0.8	0.9
Taylor	—	—	—	—	(*)	(*)	(*)	(*)	(*)
Tucker	—	—	0.2	0.2	0.2	2.4	2.1	4.7	4.9
Wayne	—	—	—	—	—	(*)	(*)	(*)	(*)
Webster	—	—	(*)	(*)	—	—	—	—	(*)
Wirt	—	—	4.7	4.7	(*)	0.3	0.3	0.6	5.3
Wood	—	—	4.6	4.6	(*)	0.3	1.0	1.3	5.9
Total	0.1	1.2	101.0	102.3	6.7	77.2	133.1	217.0	319.3

[1] Counties with no production are omitted.
* Less than 50 cords.

Table 21.—*Round pulpwood production in the Northeast, by state, received in and out of the State of production, 1965*
(In thousands of rough cords)

State	Total production	Received in state	Shipped out of state
Connecticut	12.7	(D)	(D)
Delaware	39.6	—	39.6
Kentucky	89.1	—	89.1
Maine	2,417.4	2,358.4	59.0
Maryland	154.9	(D)	(D)
Massachusetts	16.5	(D)	(D)
New Hampshire	200.4	177.2	23.2
New Jersey	51.1	51.1	—
New York	370.9	339.9	31.0
Ohio	272.5	259.2	12.9
Pennsylvania	527.5	469.0	58.5
Rhode Island	5.6	(D)	(D)
Vermont	113.0	(D)	(D)
West Virginia	319.3	—	319.3
Total	4,590.5	3,783.3	807.2

[D] Withheld to avoid disclosing data for individual mills.

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DEPARTMENT OF AGRICULTURE

The TIMBER RESOURCES of MARYLAND

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U.S. FOREST SERVICE RESOURCE BULLETIN NE-7
1967

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

PREFACE

UNDER the authority of the McSweeney-McNary Forest Research Act of May 22, 1928, and subsequent amendments, the Forest Service, U. S. Department of Agriculture, conducts a series of continuing forest surveys of the states to provide up-to-date information about the forest resources of the Nation.

A resurvey of the timber resources in Maryland was made in 1962-63 by the Northeastern Forest Experiment Station, approximately 14 years after the initial forest survey. In this resurvey, as in the initial survey, the Northeastern Station again received cooperation from the Maryland Department of Forests and Parks. The Department purchased the aerial photographs of the entire State that were used for the resurvey. State field crews remeasured some of the initial forest survey plots and established new sample plots on all the State forest land in Garrett County. For more precise local data additional plots were measured by State crews to intensify the survey in nine counties in western and southern Maryland.

This report summarizes the timber-resource situation and the changes that have taken place since the initial survey, and points out trends that may affect future timber supplies for forest industries.

In this resurvey, some of the initial plots were remeasured to provide estimates of net annual timber growth and to update the initial forest inventory. New field plots were established for an independent second estimate. These two sets of estimates were weighted and combined to give the current estimates of forest area and timber volume.

Sampling errors, which indicate reliability, are shown for many of the new estimates. Users of these data are cautioned to read with care the definitions of terms and the section pertaining to the reliability of the estimates.

COVER PHOTO: A typical mature loblolly pine stand on the Eastern Shore.

The
TIMBER RESOURCES
# of MARYLAND

by Roland H. Ferguson

●

The Author

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Big Run red pine plantation.

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Maryland's Timber Resource in Brief

FOURTEEN years have gone by since the Northeastern Forest Experiment Station made its first forest survey of the timber resources of Maryland. During this period the total forest-land acreage within the State remained fairly stable. Total timber volume increased slightly; however, volumes for some species and species groups have changed considerably. The resurvey of Maryland, completed in 1963, showed that—

- Commercial forest land amounted to 2,885,000 acres, a decrease of less than 1 percent.

- Growing-stock volume (trees 5.0 inches d.b.h. and larger) added up to 2,961 million cubic feet, an increase of 4 percent.

- Sawtimber volume of all species amounted to 6,823 million board feet—no appreciable change in total volume.

- More than one-half (53 percent) of the sawtimber volume is in trees 15.0 inches d.b.h. and larger.

- About one-half (47 percent) of the volume of hardwood sawtimber, 2,492 million board feet, is oak.

- The volume of loblolly pine sawtimber decreased by 20 percent, down to 945 million board feet.

- The volume of yellow-poplar sawtimber increased by 35 percent, to 1,237 million board feet.

- The volume of oak sawtimber increased only slightly; now it totals 2,492 million board feet.

- The volume of sweetgum sawtimber decreased by 25 percent, to 431 million board feet.

- Net annual growth of growing-stock trees is about 94 million cubic feet, and the annual cut is about 74 million cubic feet.

- Net annual growth of sawtimber is 269 million board feet, and the annual cut is about 234 million board feet.

Trends in the Timber Supply

MARYLAND'S commercial forest land[1] area of 2,885,000 acres represents 46 percent of the land area in the State. This proportion varies considerably among counties, from 30 percent in two predominantly farm counties, Carroll and Talbot, to 70 percent in the two most western counties, Allegany and Garrett. The counties with the densest population in the state—Baltimore County and the two-county area (Montgomery and Prince Georges) surrounding Washington, D.C.—still have 35 to 40 percent of their land area in commercial forest land.

A small amount of forest land (only 1 percent of the total) is classified as noncommercial. About 24,000 acres of this noncommercial forest land are unproductive because of adverse site conditions; another 19,000 acres are unproductive because of experimental ammunition contamination; and the remaining 35,000

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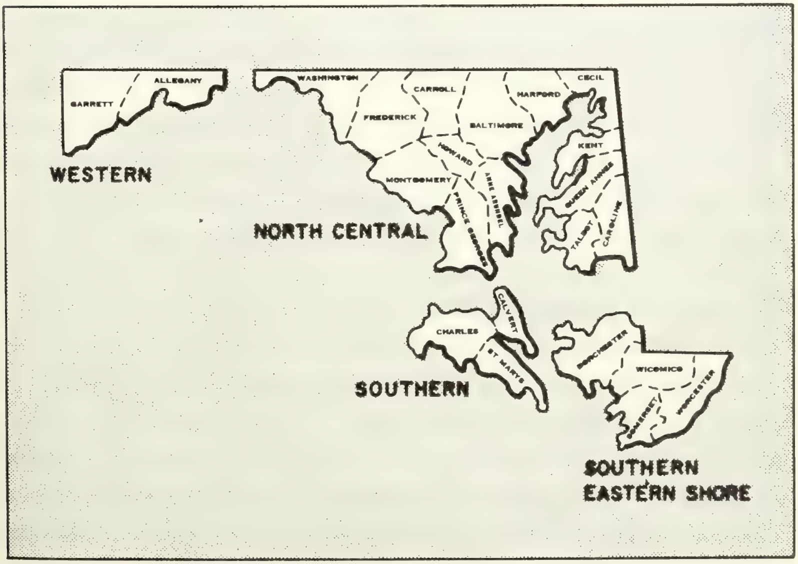
[1] See appendix for definitions of this term and other terms used in this report.



The geographic units in Maryland, 1964.

acres are withdrawn from timber utilization. About 18,000 acres of this withdrawn productive forest land are in state parks, and the rest is owned by federal agencies, principally the National Park Service.

COMMERCIAL FOREST AREA IS ABOUT THE SAME

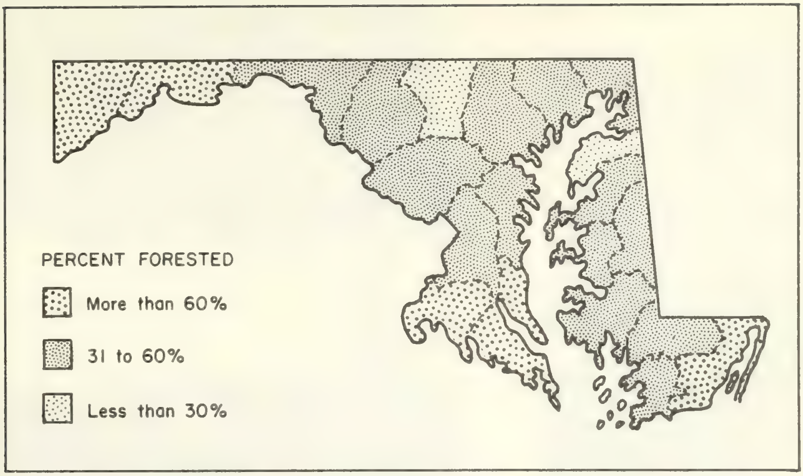
Commercial forest land in the State as a whole adds up to 2,885 thousand acres. This differs from the initial survey estimate by 12,000 acres, less than ½ percent. Three of the four geographic units recognized in this survey had insignificant changes in the acreage of commercial forest land. The southern unit had the largest change, a decrease of 28,600 acres (a 6-percent change). Acreage of commercial forest land and percent of change for each of the geographic units are as follows:

Geographic unit	*1950 (thousand acres)*	*1964 (thousand acres)*	*Change (percent)*
North-central	1,410	1,420	+0.7
Southern	463	434	—6.3
Southern Eastern Shore	545	541	—.7
Western	479	490	+2.3
State total	2,897	2,885	—.4

Individual counties showed considerably more variation in percentage of change, but most of the changes can be attributed to accuracy levels obtained in sampling. Counties in the western unit, the southern unit, and Worcester County of the southern Eastern Shore unit are the most heavily forested; more than 60 percent of their land areas is classified as commercial forest land.

Pattern of Ownership Has Changed

Farmers, or operators of farms, own about one-fourth of the commercial forest land—767,000 acres. Forest industries own about 3.5 percent, or about 101,000 acres. Public agencies own 6 percent of the commercial forest land (189,000 acres), of which the State owns 144,000 acres. Municipalities own 31,000 acres, and federal agencies own 14,000 acres.



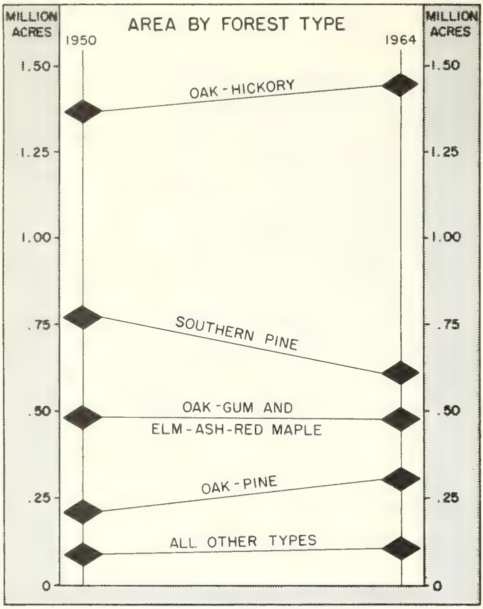
The forest cover in Maryland in 1964. Six counties in the extreme western and southern parts of Maryland are more than 60 percent forested.

Many other types of owners—such as businessmen and wage earners, professional people and sales clerks—own almost two-thirds of the commercial forest land (1,828,000 acres). Their individual holdings are not large; most of them are less than 100 acres.

Some changes took place in the pattern of ownership. The acreage of federally-owned commercial forest land in 1950 was 54,000 acres, but now the total is 13,900 acres. Several thousand acres changed from federal to private ownerships and state ownership. However, most of the change in federal ownership was due to the reclassification of some of the commercial forest land into the unproductive and reserved-productive forest land category.

State-owned commercial forest land increased from 128,000 acres to 144,000 acres primarily through the acquisition of the Wicomico State Forest, and some wildlife management areas such as Dans Mountain and Warrior Mountain in Allegany County.

Farm woodland acreage decreased by about 400,000 acres in 14 years. The 1959 U.S. Census of Agriculture showed a similar trend in the farm woodland acreage in Maryland—a decrease of 19 percent for the 9-year period between 1950 and 1959. If the



The southern-pine type decreased in area by more than 20 percent while the other types increased.

present trend of farmer-owned woodland continues, farmers soon will own less than one-fourth of the commercial forest land, and miscellaneous private ownerships will make up more than two-thirds of the total.

Southern-Pine Type Has Decreased

The southern-pine type occupies about 600,000 acres (21 percent of the commercial forest-land area) and is made up chiefly of two species—loblolly pine and Virginia pine. The type also includes small amounts of pond pine, pitch pine, and shortleaf pine. Loblolly pine is particularly common in the southern countries of the Eastern Shore and extends northward to beyond the Bay Bridge. It also occurs in the lower counties of southern Maryland. Virginia pine and shortleaf pine are more widely distributed. Virginia pine often forms nearly pure stands on drier sites of the Eastern Shore and on abandoned fields.

In the southern Eastern Shore unit, the southern-pine type makes up almost one-half of the forest area (260,000 acres).

SOME LOCAL FOREST TYPES IN MARYLAND:

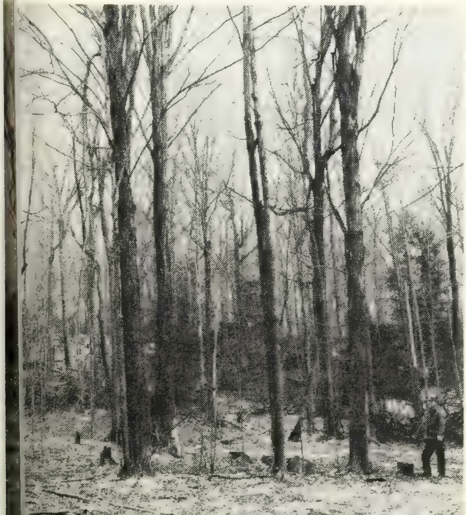
Loblolly pine.

Bald cypress.

Virginia pine
(mature and reproduction).

Yellow-poplar.

Northern hardwood
(sugar maple).



White oak.

The southern unit has more than one-third of its forest area in this type (157,000 acres). Although one-eighth (181,000 acres) of the forest area in the north-central unit is also in the southern-pine type, it is concentrated mostly in the six southern counties. Virginia pine is the principal species in this type within this unit.

The oak-hickory forest type makes up the largest acreage of any type. It covers 1,416,000 acres (49 percent of the commercial forest-land area of the State). Included in this type are about 350,000 acres upon which yellow-poplar is the principal species.

In the western unit, the oak-hickory forest type makes up 75 percent of the total; in the north-central unit, this type makes up 58 percent; and in the two southern units it makes up only 23 percent of the commercial forest land.

The oak-gum forest type ranks third largest (12 percent or 340,000 acres). This broad type is made up of several minor types in which sweetgum, blackgum, river birch, green ash, or swamp-oak species make up the plurality of stocking.

Oak-pine types have a 25- to 49-percent stocking of southern pines. They make up one-tenth (299,000 acres) of the forest area. All other forest types make up only 8 percent of the area—232,000 acres.

Some shifting of acreages in the major forest types occurred between surveys. The southern-pine forest type (consisting principally of loblolly, Virginia, and pitch pines) decreased by 164,000 acres, or about 22 percent. About one-half of this decrease in acreage shifted into the oak-pine type. The oak-pine type increased by 93,000 acres, and the oak-hickory type increased by 63,000 acres. Changes in acreages of other forest types were small.

The downward trend in the acreage of the southern-pine forest type will result in a further reduction of the volume of loblolly pine available for cutting.

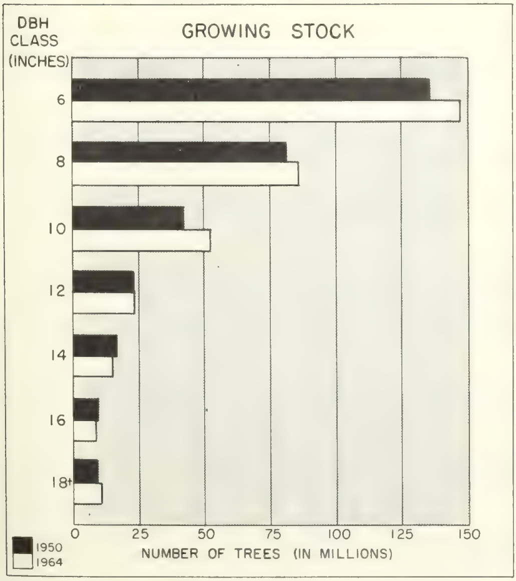
GROWING-STOCK VOLUME IS SLIGHTLY GREATER

Although there was practically no change in total commercial forest area in Maryland between surveys, the current estimate of growing-stock volume indicates an increase in volume since the first inventory. Growing-stock volume increased to 2,961 million cubic feet, about 4 percent more than the inventory of 1950.

The number of growing-stock trees 5.0 inches d.b.h. and larger also increased between surveys by about 8 percent. Softwoods decreased by about 24 percent, but hardwoods offset this by an increase of about 24 percent. Most of the increase was in the smaller diameter classes.

Growing-stock volume increased in the western and north-central units and decreased in the southern units as indicated in the following tabulation:

Geographic unit	*Million cubic feet in—* *1950*	*1964*	*Change (percent)*
North-central	1,292	1,486	+15
Southern	546	428	—22
Southern Eastern Shore	649	581	—11
Western	351	466	+33



The number of growing-stock trees increased about 8 percent between surveys. Most of the increase was in poletimber trees.

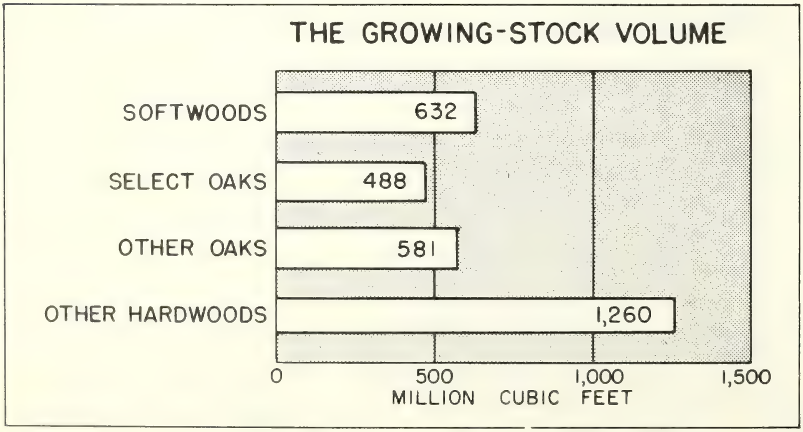
Sawtimber trees (sawlog portion and upper stem) make up 56 percent of the total live-tree volume; poletimber trees make up 38 percent; and cull trees make up 6 percent. These proportions coincide closely with those of the initial survey. The current growing-stock volume in sawtimber trees is 1,773 million cubic feet, and in poletimber trees it is 1,188 million cubic feet.

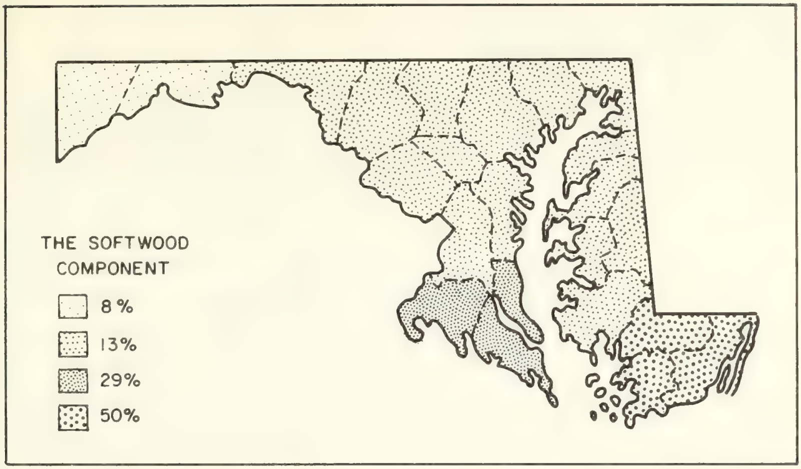
Oaks Predominate Over All Other Species

Maryland's forests are predominantly hardwood. Hardwood species make up 2,329 million cubic feet, nearly four-fifths of the growing-stock volume. Oaks are the principal species; they are found throughout the State. All together they make up 46 percent of the hardwood volume, a total of 1,069 million cubic feet. Select oak species (mostly white oak and northern red oak) make up almost one-half the volume of all oaks—488 million cubic feet. All other hardwoods total 1,260 million cubic feet.

Softwood species make up only one-fifth of the growing-stock volume in the State, 632 million cubic feet. The proportion of softwood volume to the total growing-stock volume varies considerably for each geographic unit; the softwood volume ranges

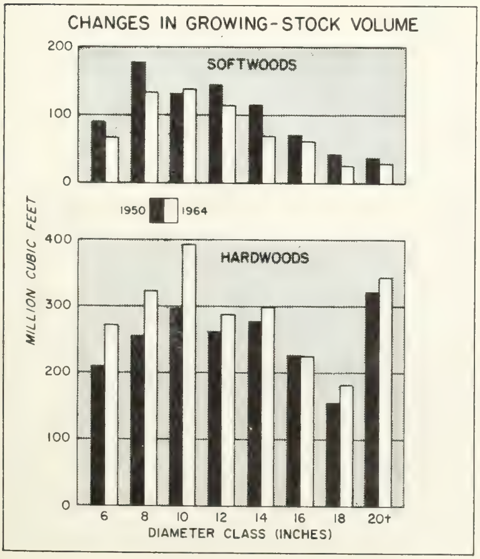
Softwoods make up one-fifth of the growing-stock volume, and hardwoods make up four-fifths.





Softwoods make up half of the volume in the South Eastern Shore geographic unit.

from 8 percent of the total volume in the western unit to 50 percent in the southern Eastern Shore unit. Two-thirds (433 million cubic feet) of the softwood growing-stock volume is in sawtimber-size trees.



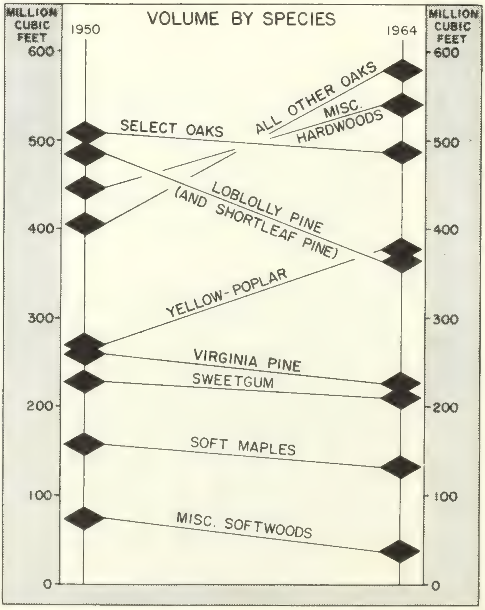
Most of the changes in volume took place in the hardwood poletimber diameter classes; total softwood volume decreased and total hardwood volume increased.

Hardwoods Increased — Softwoods Decreased

Between surveys the cubic-foot volume of hardwoods increased by 15 percent, with more than two-thirds of the increase in the three poletimber diameter classes. In sharp contrast, the cubic-foot volume of softwoods decreased by 23 percent, with almost 40 percent of the decrease in the two poletimber diameter classes. For the State as a whole, there is a downward trend in the proportion of softwood volume to total growing-stock volume; softwoods now make up only 21 percent of the total volume.

Some species were cut more heavily than others; some grew more rapidly than others: so in the period between surveys volumes of some species changed considerably. Loblolly pine and yellow-poplar are the two species that had the greatest change in net cubic-foot volume. Loblolly pine decreased 25 percent, and yellow-poplar increased 40 percent.

The volume of select oak species changed only slightly between surveys. But because the volume of all hardwood species increased between surveys, the proportion of the hardwood volume



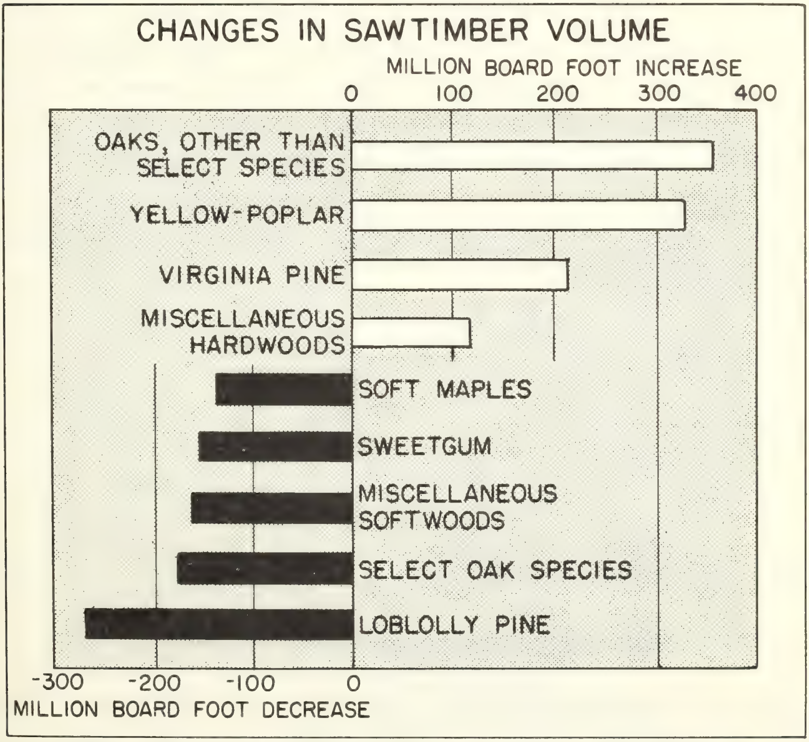
Loblolly pine and yellow-poplar are the two species with the greatest change in cubic-foot volume.

of the select oak species group changed from about one-fourth in 1950 to about one-fifth in 1964.

Sweetgum and soft maples were the only hardwood species that decreased materially in volume. Their volume decreased by about 10 percent. Volumes of all other hardwoods increased by 30 percent.

SAWLOG SUPPLY: NO APPRECIABLE CHANGE

Sawtimber volume in Maryland totals 6.8 billion board feet. Although there was practically no change for the State as a whole, some changes in sawtimber volume occurred in the geographic units. Only the western unit had little change in total board-foot volume as indicated in the following tabulation:

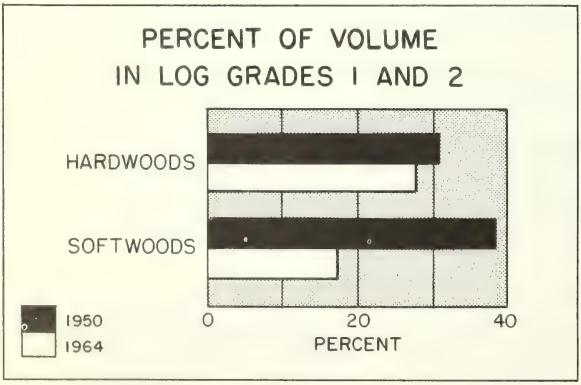


Losses in sawtimber volume for some species are offset by increases for other species.

Geographic unit	*Million board feet in—* *1950*	*1964*	*Change (percent)*
North-central	3,399	3,939	+16
Southern	1,319	1,091	—17
Southern Eastern Shore	1,312	1,147	—13
Western	638	646	+1

The southern pines have been cut more heavily than the hardwoods. For the State as a whole, the volume of softwoods decreased by 12 percent to the current volume of 1,507 million board feet. Hardwoods increased in volume by 7 percent, up to 5,316 million board feet. In 1950, the volume of softwoods made up 25 percent of the total board-foot volume, but by 1964 the volume of softwoods dropped down to 22 percent of the total. The reduction of southern pine volume in many stands is reflected in the change in acreage of the southern pine type into the oak-pine and oak-hickory forest types.

Within the softwood and hardwood species groups, some species increased considerably in board-foot volume while other species decreased. Virginia pine volume increased by about 70 percent, but the decrease in volume of loblolly pine and other softwoods resulted in a decrease in total volume of all softwoods. The board-foot volume of select oak species, soft maples, beech, and sweetgum decreased by about 20 percent, while the volume of other oaks, yellow-poplar, and miscellaneous hardwoods increased by about 30 percent.



Log quality has decreased between surveys.

Volume in Large Trees Remains the Same

Total sawtimber volume in diameter classes 16 inches d.b.h. and larger has remained about the same between surveys. However, softwoods in this category decreased 24 percent in board-foot volume. This was offset by a 6-percent increase in hardwood board-foot volume. Softwood board-foot volume increased only in the 10-inch diameter class, and hardwood board-foot volume decreased only in the 16-inch diameter class.

Sawlog Quality is Declining

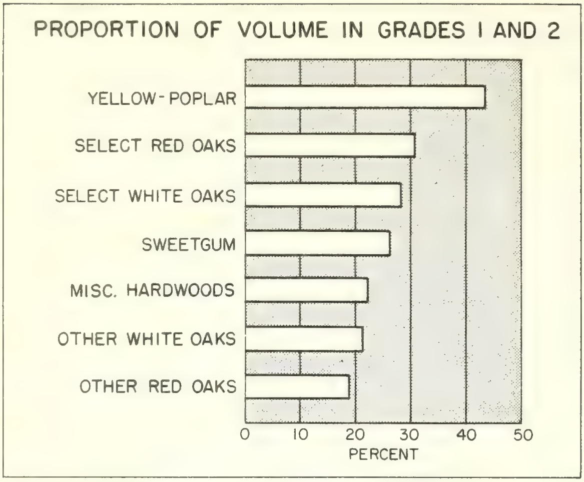
The proportion of the volume in log grades 1 and 2 declined from one-third of the total graded volume in 1950 to one-fourth of the total in 1964. Total sawtimber volume (excluding that for miscellaneous softwoods) in log grades 1 and 2 decreased about 20 percent between surveys:

Standard-lumber log grade	*Volume in 1964 (million board feet)*	*Change from 1950 (percent)*
1	561	—21
2	1,141	—19
Other	5,063	+17

Timber quality for hardwoods as a group has changed little between surveys. The volume in standard-lumber logs of grades 1 and 2 decreased about 5 percent. In 1950 the board-foot volume of hardwoods in these better grades made up 31 percent of the total hardwood volume, but by 1964 the proportion had dropped to 27 percent.

Softwood timber quality (southern pine) declined drastically. The volume of pine that met grade 1 specifications dropped by more than two-thirds, and the volume that met grade 2 specifications dropped by more than one-half. These large decreases were due to the big reduction in softwood board-foot volume in the larger diameter classes. Volume in 14-inch d.b.h. and larger trees decreased by about 30 percent.

The quality of some individual hardwood species and groups of hardwoods varied considerably from the average for all hardwoods. The proportions of grades 1 and 2 volume in 1964 ranged



Yellow-poplar sawtimber trees have a larger proportion of the volume in the better log grades than any other species.

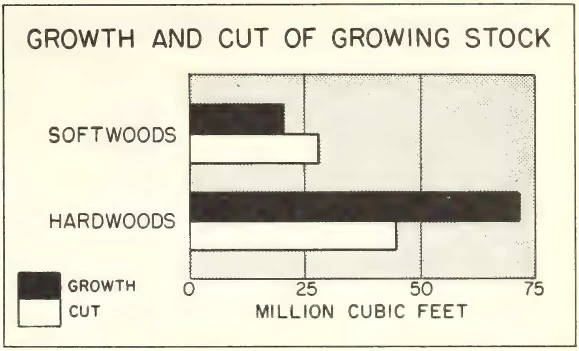
from a low of 18 percent for the other-red-oaks group to a high of 42 percent for yellow-poplar.

Between surveys, the quality of some hardwood species did not change. Other hardwood species had considerable change. For example, yellow-poplar had the greatest increase in the proportion of high-quality log volume—from 25 percent of the yellow-poplar total in 1950 to 42 percent of the total in 1964. Offsetting this increase, the proportion for the select oak species group decreased from 36 percent of the select oak volume to 28 percent.

THE GROWTH-CUT RELATIONSHIPS

Net annual growth of all growing stock is almost 94 million cubic feet, and the annual timber cut is about 74 million cubic feet, an apparent excess of 20 million cubic feet of growth over cut. The net annual growth is equivalent to 32 cubic feet per acre of commercial forest land, which indicates that the forest land is growing wood at less than its capacity.

Estimates of net annual growth for the initial survey show that the growth of growing stock (accretion) made up approximately three-fourths of total gross growth. On the resurvey, this proportion dropped to about one-half. Loss of tree volume due to change in tree classification from merchantable to unmerchantable was

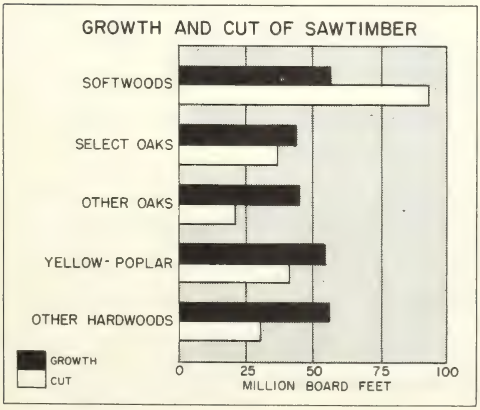


Growing-stock growth exceeds annual cut.

partially responsible for this reduction. About one-eighth of the gross annual growth is lost, due to mortality. Summing up, the volume (in millions of cubic feet) for components of net annual growth are:

Growth on growing stock	56.6
Ingrowth into poletimber	+50.9
Gross annual growth	107.5
Annual mortality	—13.8
Net annual growth	93.7

The reader is cautioned to recognize the sampling errors for the inventory estimate and the growth estimate when he compares the inventory change between surveys with the estimated growth. When sampling accuracy is considered, the inventory change and the growth-cut relationship are in balance.



Softwood timber growth needs to be increased.

Softwoods are Overcut

Softwood species are cut more heavily than hardwoods; the 28 million cubic-foot cut exceeds growth by about 8 million cubic feet (38 percent). Few of the hardwood species are overcut, and some are growing at a rate that is more than double the rate of cut. The hardwoods as a group are growing at a rate of 73 million cubic feet a year, and the annual cut is only 46 million cubic feet (about two-thirds the growth).

The net annual growth of sawtimber (269 million board feet) exceeds the annual cut (233 million board feet), but the excess is only in the hardwood species. At the time of the initial survey, the softwood sawtimber cutting rate was one and a half times that of growth. The heavy overcutting of softwoods greatly reduced the inventory of softwood sawtimber volume. Softwood sawtimber is now being overcut by about 60 percent, and this will further reduce the softwood inventory volume.

Net annual growth and cut are about in balance for the select oak species group. The cut of yellow-poplar could be increased by about 30 percent without exceeding the annual growth. The annual cut of all other hardwoods could be about double the current cut and not exceed the board-foot net annual growth.

Trends in Timber Use

Forest industries in 1963 produced 70 million cubic feet of timber products from the timber resources in Maryland. Nine-tenths of the output came from roundwood, and the other tenth came from plant byproducts. Sixty percent of the total production was from hardwood species, a larger proportion of hardwoods than in 1952.

The output of industrial products, which includes all timber products except fuelwood, has increased during the past 50 years. The first comprehensive estimate for industrial products was 47 million cubic feet in 1914.[2] Output estimates for 1938 and 1941

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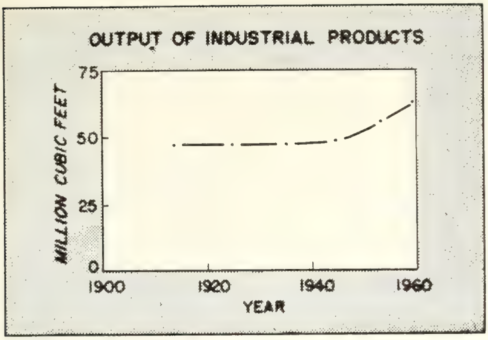
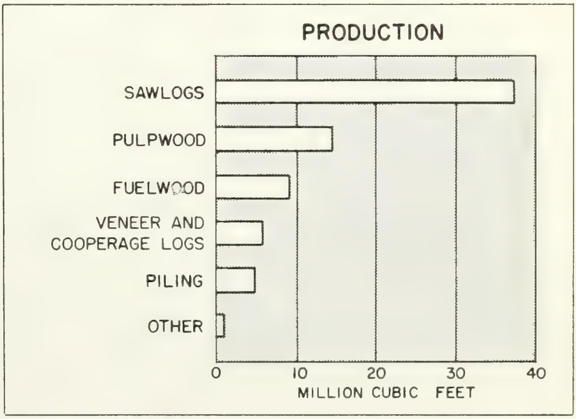
[2] Besley, F. W. THE FORESTS OF MARYLAND. Md. State Bd. Forestry, 152 pp., illus. 1916.



Output of timber products is increasing.

were reported in units of board feet, cords, and numbers.[3] If the 1941 volumes and numbers were converted to cubic feet, the estimates would total about 46 million cubic feet. After 1941, the output of industrial products began an upward trend, with 53 million cubic feet in 1952 and 62 million cubic feet in 1963.

Sawlogs continued to be the major product. They accounted for 52 percent of the total cubic-foot output. Pulpwood ranked second in the volume of output in 1963, exchanging places with fuelwood, which ranged second in 1952. Pulpwood output doubled between surveys, and fuelwood output decreased about 60 percent. Mine timbers, which ranged fourth (3 percent of the total) in



Sawlogs made up more than half of the 1963 output of timber products.

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[3] Burns, F. MARYLAND FORESTS AND FORESTRY. Md. Bd. Natural Resources, 56 pp., illus. 1948.

1952, accounted for negligible volume in 1963. The output of veneer logs and bolts, cooperage logs and bolts, and piling has more than doubled since 1952. Now they make up about 14 percent of the timber-products output.

LUMBER PRODUCTION IS AT HIGH LEVEL

Lumber production in Maryland has averaged more than 100 million board feet a year since 1869, the earliest date for which production records or estimates were compiled.[4] Production dipped to its lowest points in 1917 (68 million board feet), 1928 (69 million board feet), and 1933 (80 million board feet). The peak of lumber production was reached in 1909 when 268 million board feet were produced. Since 1933 the trend of lumber production has been generally upward. It increased to 205 million board feet in 1952, but dropped slightly to 190 million board feet in 1963.

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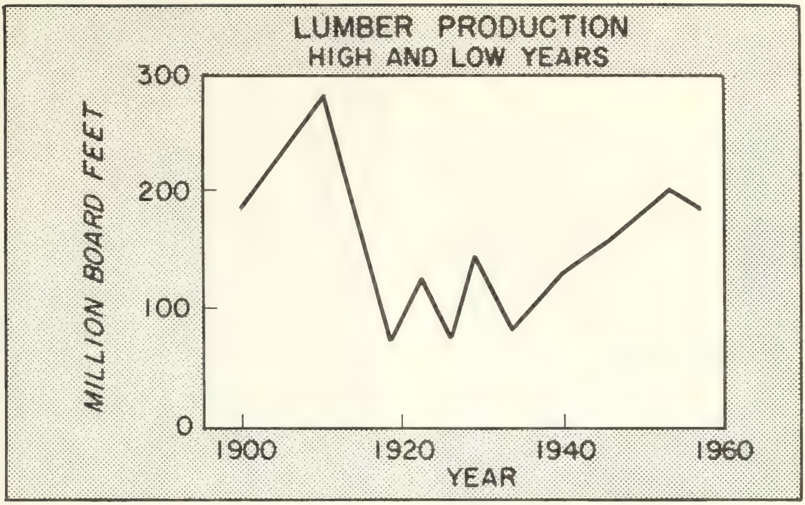
[4] Steer, H. B. LUMBER PRODUCTION IN THE U. S., 1799-1946. U. S. Dep. Agr. Misc. Pub. 669, 233 pp. 1948.

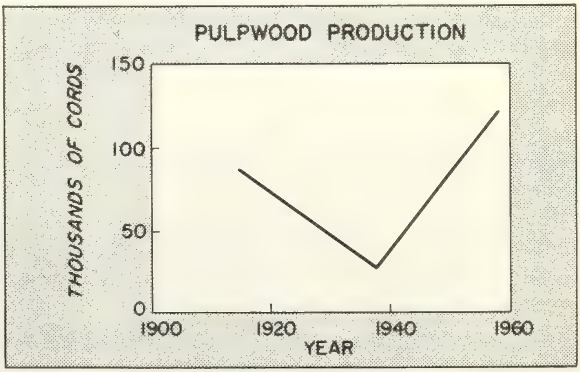
Log and lumber yard of sawmill in Harco, Md.



Lumber production has remained high in recent years.

PULPWOOD PRODUCTION IS INCREASING

Pulpwood production is increasing in volume and importance. However, past production data are limited. The earliest estimate is for 1914 when 74,000 long cords (92,000 standard cords) was reported.[2] Another estimate was made for 1938, at which time 31,000 standard cords of pulpwood was produced.[3] At the time of the initial forest survey, pulpwood production was back to 92,000 cords. The trend has continued upward to 138,000 cords in 1963. This latter figure does not include 46,000 cords from plant byproducts.



Production of pulpwood has increased sharply since 1938.

SOME OTHER PRODUCTS FROM MARYLAND'S FORESTS:

Photo Credit: Ken Ferguson

Poles and piling
ready for loading.

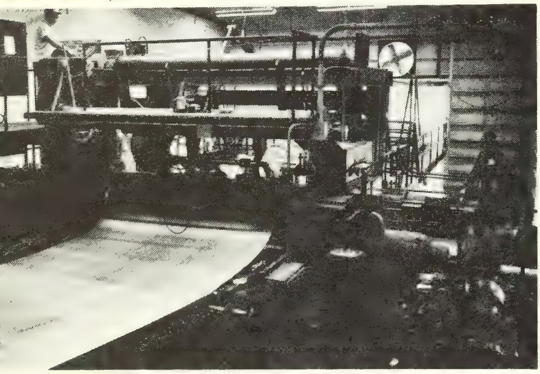


Photo credit: U. S. Plywood Corporation

Veneer from southern
pine, Pocomoke City, Md.

Stockpile of Sweetgum spoon bolts.

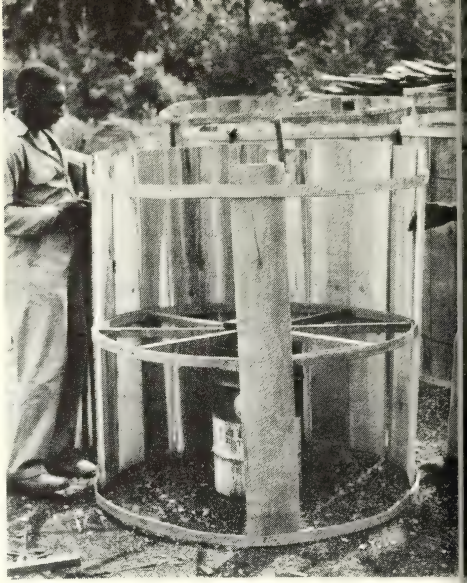
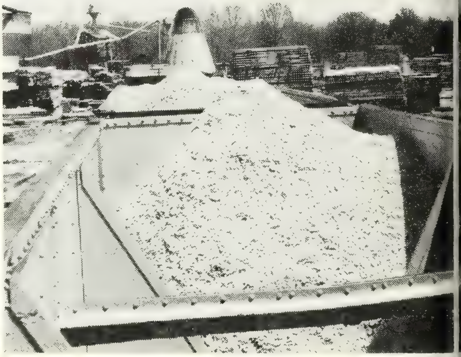


Photo Credit: M. E

Tobacco hogshead assembly.



Pulpwood chips being loaded
for market, Snow Hill, Md.

Sweetgum shredded bark mulch.

Timber-Supply Outlook

The general outlook is for little change in the total area of commercial forest land in Maryland upon which timber can be grown. Forest areas that have been removed from timber production for urban development, rights of way, or other nonforest use have been offset by areas of abandoned farmland and pastures that reverted back to forest use.

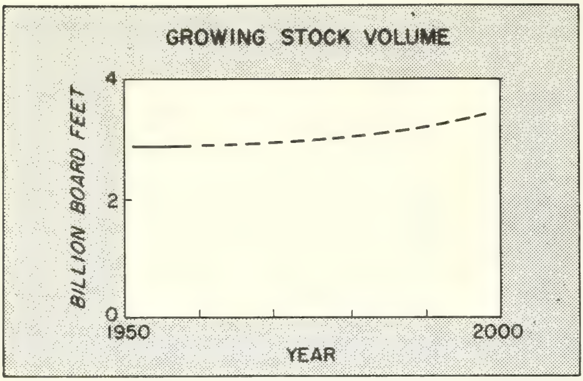
The availability of inventory volume data from two forest surveys in Maryland provides an opportunity for analyzing the timber situation and the trends suggested by the real changes between inventories. Furthermore, with the trend information as a guide, projections of the timber situation to specified years are possible.

The development of a computer program that can be used to project present inventory volume, timber cut, annual growth, and mortality estimates to any specified year in the future has aided considerably in predicting the future of Maryland's timber resource. This program (timber resource analysis system) makes possible stand-table projections based on annual growth rates, and we can convert the stand table to a stocking table by using appropriate tree volumes. The program handles estimated timber cut by one of several options specified for the anticipated situation.

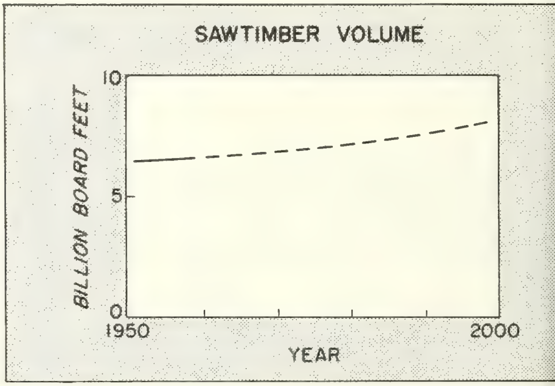
In Maryland, the estimates based upon remeasured plots reveal that softwood cut exceeds growth and that hardwood cut was only about 60 percent of the growth. Other data also reveal that the annual hardwood cut has been increasing.

Based on the past trend of hardwood cutting and indications that this situation would not materially change, the 1963 hardwood inventory was projected for 30 years, using a given cut per acre per year (table 34). The cut per acre for the projection period was increased at the same rate as it had been increasing in the past.

Softwoods presented a different situation. Although the present annual cut exceeds growth, it is apparent that the timber owners and users in the State wish to modify this situation to prevent further drastic reduction of the softwood inventory. On this basis, the 1963 softwood inventory was projected, using the timber cut



Growing-stock volume will gradually increase for the next 30 years.



Sawtimber volume will increase more rapidly in the future.

option that would bring cut and growth into balance by the end of the 30-year projection period.

What do the trend analysis and the projections indicate for Maryland forests?

Looking ahead 30 years, we expect that the growing-stock inventory volume will be 3,290 million cubic feet, an increase of about 11 percent. In 1964 softwoods made up 21 percent of the total cubic-foot volume, but by 1994 softwoods will make up only 11 percent. By 1994 the assumed cut and net annual growth for softwoods will be about in balance at 13 million cubic feet a year, and the annual cut for hardwoods will be about 30 percent less than the net annual growth.

Sawtimber volume will have a similar trend over the same period of time. Board-foot volume will increase about 19 percent, to about 8,110 million board feet in 1994. At that time the annual growth and timber cut of softwoods will be about equal—approximately 30 million board feet. In 1964 the average sawtimber volume per acre was 2,360 board feet. If we assume that there will be no decrease in commercial forest-land area and no increase in acreage under forest management, the average volume per acre will increase to about 2,800 board feet in 1994.

Although the overall volume changes are not large, the changes for some individual species are unfavorable. Loblolly pine, for example, an important species in the southern and eastern counties of Maryland, is one of the most heavily cut in relation to its inventory volume. The volume of loblolly pine dropped to 945 million board feet in 1964, a decrease of 21 percent. If this downward trend continues, the inventory of loblolly pine in 1994 will be about half of what it was in 1964.

Similarly, some hardwood species (such as red maple, sweetgum, white oak, and northern red oak) are being cut at a much faster rate than they are growing. Unless a considerably larger acreage of privately owned forest land is put under some kind of management to favor the more valuable species of hardwood trees, the composition of the timber stands in Maryland will change to a larger percentage of the less desirable and unwanted species.

In summary, the growing-stock volume in Maryland will continue to increase annually during the next 30 years; however, this increase will be at a continually decreasing rate.

Management Opportunities

Net annual growth of timber on commercial forest land in Maryland is much less than its potential. In 1948 it was estimated that the forest land was producing 29 cubic feet per acre annually, and that under good management it was capable of producing about 70 cubic feet.[3] In 1964, net annual growth was calculated to be 32 cubic feet per acre, still much below what is possible.

The density of stocking exerts considerable influence upon the rate of growth. Only about one-half of the commercial forest land in 1964 was well stocked (70 percent or more) with growing-stock trees. Almost 10 percent of the forest land was poorly stocked and nonstocked (less than 40 percent stocked). An increase in the density of stocking would result in an increase in volume-per-acre growth.

Even more important than the stocking of growing-stock trees are the stocking of desirable trees and the presence of little or no inhibiting vegetation, adequate seed sources, and favorable seedbed conditions. A little more than 2 percent of the commercial forest land is stocked 70 percent or more with desirable trees. Mature stands in this area-condition class require no treatment, but immature stands may need thinning. Another 2 percent will become stocked 70 percent or more with desirable trees in time because there are adequate seed sources, favorable seedbed conditions, and no inhibiting vegetation.

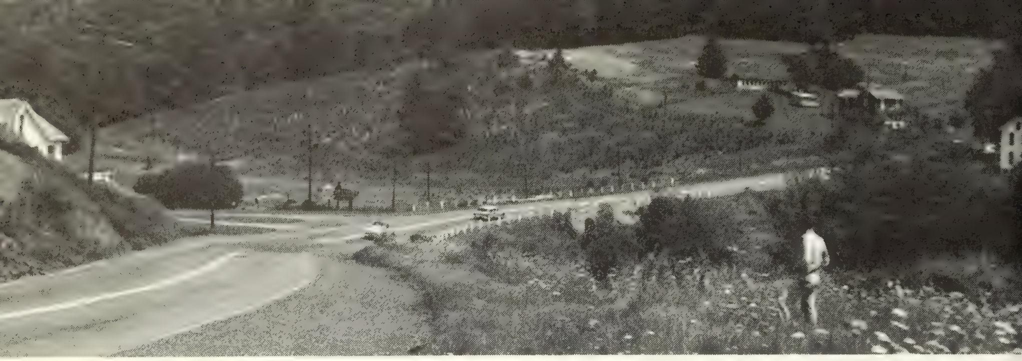
Therefore there is an opportunity to increase the stocking of desirable trees on about 95 percent of the commercial forest-land area through timber-stand improvement and area treatment. This forest area is controlled by other than desirable trees or inhibiting vegetation, or may lack adequate seed sources, or may have seedbeds unfavorable to natural regeneration.

The loblolly-shortleaf pine forest type, in 1950, occupied about 400,000 acres in southeastern Maryland. By 1964 this acreage decreased to about 300,000 acres, a loss of 100,000 acres that reverted to the oak-pine or hardwood forest types. Loblolly pine is one of the more desirable species, and within its natural range in southeastern Maryland, there is an opportunity to increase its acreage and volume.

Many landowners in eastern Maryland have undertaken to establish or favor stands of loblolly pine—often under the guidance of State foresters; or in the case of some industrial holdings, under the supervision of company foresters. The measures used have varied widely because they were adapted to specific conditions. The following treatments have been used alone or in some combination: the application of herbicides to individual trees or the use of mistblowers on the foliage of understory trees and shrubs; prescribed burning, disking, or bulldozing to reduce hard-

Land preparation for planting to loblolly pine.

Planting of loblolly pine.



Three-year-old red pine plantation as part of a farm.

wood competition and improve conditions for pine establishment; and planting. Since 1950, in the lower six Eastern Shore counties about 40,000 acres of timberland have received some kind of timber-stand improvement.

Opportunities and objectives in managing Maryland's forests vary widely. In the Washington-Annapolis-Baltimore area population growth is expected to further reduce the scattered areas of woodland. Throughout Maryland, but especially near the population centers and on the relatively poor sites of western Maryland, recreation is becoming a major objective in woodland management. Only on the lower Eastern Shore is ownership by wood-using firms an important part of the land-ownership pattern. These firms are doing much to increase the quality of timber growth on their lands. Elsewhere the small timberland owners may be stimulated to undertake stand-improvement treatments since desirable species and high-quality trees are aesthetically pleasing and offer financial returns to help meet carrying charges on the land.

Farmers and other individuals in many kinds of occupations own 90 percent of the commercial forest land, but the management of their woodlands for the highest possible timber yield is not the primary interest of most of them. Nevertheless, from their lands comes most of the timber that is cut each year. If timber growth is to be increased, it will be mainly through management activities of the private forest landowner. The Maryland Department of Forests and Parks through its district foresters offers technical assistance to all those interested in improving their forest woodland and timber stands.

Appendix

DEFINITIONS OF TERMS

Forest Area

Forest land area.—This includes: (a) lands that are at least 10 percent stocked with trees of any size and are capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and that has not been developed for other use; and (c) afforested areas. (Forest tracts of less than 1 acre, isolated strips of timber less than 120 feet wide, and abandoned fields and pastures not yet 10 percent stocked with trees are excluded.)

Commercial forest land area.—Forest land that is (a) producing, or physically capable of producing, crops of industrial wood (usually sawtimber); (b) economically available now or prospectively; and (c) not withdrawn from timber utilization through statute, ordinance, or administrative order.

Noncommercial forest land area.—Forest land that is (a) withdrawn from timber utilization through statute, ordinance, or administrative order, but that otherwise qualifies as commercial forest land; or (b) incapable of yielding industrial wood products (usually sawtimber) because of adverse site conditions.

Timber Volume

Growing stock.—Net volume, in cubic feet, of live sawtimber and poletimber trees (see definitions under "Class of Timber") from stump to a minimum 4-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot.

Sawtimber volume.—Net volume in board feet, International ¼-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Standard cord.—A unit of measure for stacked wood encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates by applying a factor of 80 cubic feet of wood (inside bark) per rough cord.

Tree Classes

All trees.—All live sawtimber and poletimber trees, seedlings and saplings, and all live cull trees.

Growing-stock trees.—All live sawtimber trees, poletimber trees, and seedlings and saplings, except cull trees. (See definitions under "Class of Timber.")

Desirable trees.—All growing-stock trees that now or prospectively have positive stumpage value (primarily for lumber production) and are most likely to remain in the stand for at least 10 years if not cut or otherwise deliberately killed.

Sawtimber trees are considered to have positive stumpage value now if they have a grade 1 or 2 butt log. Exceptions are made for several species that can have a lower quality butt log.

Poletimber trees are considered to have positive stumpage value if they will meet the above sawtimber tree requirements before becoming mature.

Stocking Classes

Stocking is a measure of the utilization of available growing space. The eastern standard of 75 square feet of basal area per acre is based upon a wedge-prism (BAF-37.5) tally of two growing-stock trees, 5.0 inches d.b.h. and larger, and their equivalent in smaller-size saplings and seedlings at each point. The stocking percentage for a sample plot is derived from the stocking of each of the ten points. Three categories of stocking are used:

All live trees.—These are used in the classification of forest land and forest types.

Growing-stock trees.—These are used in the classification of stand-size classes.

Desirable trees.—These are used in the classification of area-condition classes.

Stand-Size Classes

Stand.—A growth of trees on a minimum of 1 acre of forest land that is at least 10 percent stocked by forest trees of any size.

Sawtimber stands.—Stands that are at least 10 percent stocked with growing-stock trees and have half or more of this stocking in sawtimber and poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands that are at least 10 percent stocked with growing-stock trees and have half or more of this stocking in sawtimber and poletimber trees, and with poletimber stocking exceeding that of sawtimber stocking.

Sapling-and-seedling stands.—Stands that are at least 10 percent stocked with growing-stock trees and in which saplings and/or seedlings make up a plurality of this stocking.

Nonstocked areas.—Commercial forest lands that are less than 10 percent stocked with growing-stock trees.

Area-Condition Classes

Class 1.—Areas that are stocked 70 percent or more with desirable trees.

Class 2.—Areas that are stocked 40 to 70 percent with desirable trees and in which 30 percent or less of the area is controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Class 3.—Areas that are stocked 40 to 70 percent with desirable trees and in which more than 30 percent of the area is controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Class 4.—Areas that are stocked less than 40 percent with desirable trees and have adequate seed sources and seedbeds favorable to natural restocking.

Class 5.—Areas that are stocked less than 40 percent with desirable trees and have inadequate seed sources and/or seedbeds unfavorable to natural regeneration.

Forest Cover Types

The forest-type classification of each sample plot is based upon the majority of stocking by all live trees of various species. When no indicator species makes up a majority, the forest type is determined on the basis of plurality of stocking.

Loblolly-shortleaf pine.—Forests in which 50 percent or more of the stand is loblolly pine, shortleaf pine, or other southern yellow pines, singly or in combination. In Maryland pitch pine and Virginia pine predominates on almost one-half of the area in this type.

Oak-pine.—Forests in which 50 percent or more of the stand is hardwood, usually upland oaks, but in which southern pines make up 25-49 percent of the stand.

Oak-hickory.—Forests in which 50 percent or more of the stand is upland oaks or hickory, singly or in combination, except where pines comprise 25-49 percent, in which case the stand would be classified oak-pine. In Maryland, it includes the yellow-poplar-oak forest type.

Oak-gum-cypress.—Bottomland forests in which 50 percent or more of the stand is blackgum, sweetgum, or oaks, singly or in combination, except where pines comprise 25-49 percent, in which case the stand would be classified as oak-pine.

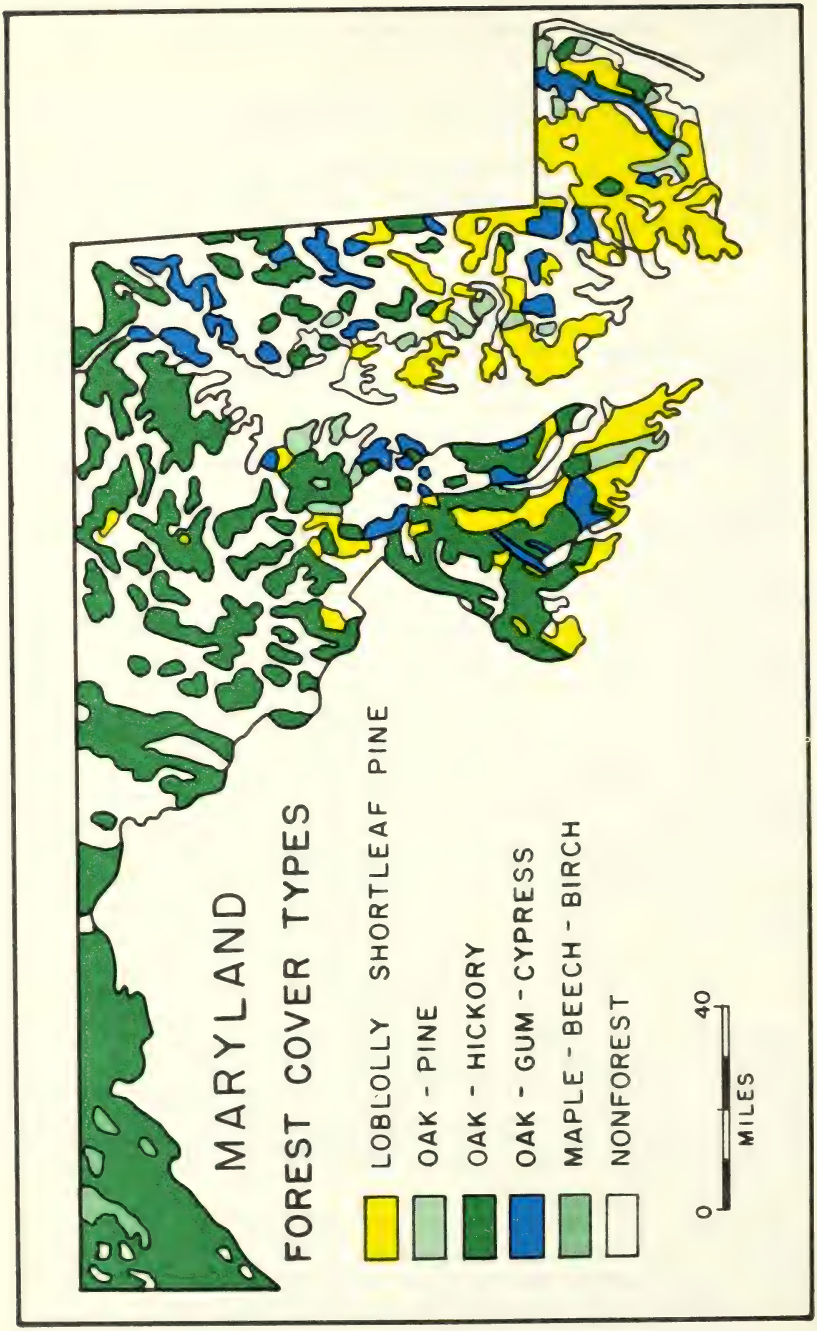
Minor types in Maryland.—White pine type, spruce type, elm-ash-red maple type, maple-beech type, and aspen type are forests in which 50 percent or more of the stand is in the named species, singly or in combination.

Class of Timber

Sawtimber trees.—Trees of commercial species that: (a) are of the following minimum diameters at breast height—softwoods 9.0 inches and hardwoods 11.0 inches; and (b) contain at least one merchantable sawlog. (A merchantable sawlog is a portion of a live tree that meets the minimum log-grade specifications, as defined under log-grade classification. The sawlog portion is that part of the tree between the stump and the top of the last merchantable sawlog.)

Poletimber trees.—Trees of commercial species that meet regional specifications of soundness and form, and are of the following diameters at breast height; softwoods 5.0 to 9.0 inches; hardwoods 5.0 to 11.0 inches. Such trees will usually become sawtimber trees if left to grow.

Sapling-and-seedling trees.—Trees of commercial species that are less than 5.0 inches in diameter at breast height and of good form and vigor.



The major forest cover types in Maryland.

Cull trees.—Live trees of sawtimber or poletimber size that are unmerchantable for sawlogs now or prospectively because of defect or rot, or because they are of noncommercial species.

Log Grades

The standard-lumber log grades for hardwoods and the yellow pines used in the resurvey of Maryland are outlined in the figures below.

YELLOW PINE LOGS

Grade	*Diameter (in inches, inside bark)*	*Length (feet)*	*Surface requirements*
1	10-16	8+	Surface clear (not considering adventitious knots or branches).
	16+	8+	Not more than three 2- to 4-inch knots and any number of smaller knots.
2	8-9	8+	Surface clear.
	10-13	8+	Any number of small knots (less than 2 inches in diameter).
	14+	8+	Not more than six 2- or 4-inch knots and any number of smaller knots.
3	6-7	8+	Any number of small knots not exceeding 1-inch in diameter.
	8-13	8+	Not more than six 2- to 4-inch knots and any number of smaller knots.
	14+	8+	More than six 2- to 4-inch knots. Any log with one or more knots 5 inches or larger.
	Knotty or crooked merchantable logs 8 inches d.i.b. or larger and 10 feet in length or longer that do not fall in either Grade 1 or Grade 2.		

The grade standards used for yellow-pine logs in the forest survey of Maryland.

HARDWOOD STANDARD-LUMBER LOGS

*Grade Factors**		*Specifications*							
		Log grade 1			*Log grade 2*				*Log grade 3*
Position in tree		Butts only	Butts & uppers		Butts & uppers				Butts & uppers
Minimum diameter (inches)		[1] 13-15	16-19	20+	[2] 11	12+			8+
Minimum length (feet)		10+	10+	10+	10+	8-9	10-11	12+	8+
Clear** cuttings on each of the 3 best faces	Min. length (feet)	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	—
	Min. yield face length	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Max. sweep and crook allowance; % of gross vol.		15			30				50
Max. cull and sweep allowance; % of gross vol.		[3] 40			[4] 50				50

* End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in U.S. Forest Prod. Lab. Rpt. D1737.

** A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.

[1] Ash and basswood butts can be 12 inches if otherwise meeting the requirements for small No. 1's.

[2] 10-inch logs of all species can be No. 2 if otherwise meeting the requirements for small No. 1's.

[3] Otherwise No. 1 logs with 41-50 percent cull can be No. 2.

[4] Otherwise No. 2 logs with 51-60 percent cull can be No. 3.

The specifications used in the forest survey of Maryland for hardwood standard-lumber logs, based on U.S. Forest Products Laboratory studies.

HARDWOOD TIE-AND-TIMBER LOGS

Grade Factors		*Specifications*
Position in tree		Butts and uppers
Scaling diameter (inches)		8+
Length, without trim (feet)		8+
Clear cuttings		No requirements. Not graded on cutting basis.
Max. sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar* diameter that is more than one-third of log diameter at point of occurrence.
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound** surface defects permitted		Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.

* Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

** Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

The timber-grading specifications used for hardwood tie and construction timber.

Annual Growth and Cut

Net annual growth of sawtimber.—The annual change (resulting from natural causes) in net board-foot volume of live sawtimber on commercial forest land during the period between surveys.

Ingrowth of sawtimber.—The net board-foot volume of trees that first became sawtimber trees during the inventory year as measured at the end of the year.

Annual mortality of sawtimber.—The net board-foot volume removed yearly from live sawtimber on commercial forest land through death from natural causes.

Annual cut of live sawtimber.—The net board-foot volume of live sawtimber trees cut or killed in logging, land-clearing, or cultural operations on commercial forest land during a year.

Net annual growth of growing stock.—The annual change (resulting from natural causes) in net cubic-foot volume of live sawtimber and poletimber trees on commercial forest land.

Ingrowth of growing stock.—The total net cubic-foot volume of trees that first become a part of growing stock during the inventory year as measured at the end of the year.

Annual mortality of growing stock.—The net cubic-foot volume removed yearly from growing stock through death from natural causes.

Annual cut of growing stock.—The net cubic-foot volume of live sawtimber and poletimber trees cut or killed in logging, land-clearing, or cultural operations on commercial forest land during a year.

FOREST-SURVEY METHODS

Forest-area and timber-volume estimates are based upon information obtained from two sets of aerial photographs (10 or more years between the two) and sample photo plots and ground plots. Photo plots were pin-pointed on each set of aerial photographs so they were distributed uniformly over the entire State. Each photo plot was classified as either forest or nonforest, and each forest plot was classified into sampling strata. These strata were stand-size classes on the initial survey and were cubic-foot-volume-per-acre classes on the resurvey.

Field crews on the first survey inspected on the ground many sample plots selected from the photo plots. Area, volume, and growth data were recorded. These data were the basis for *The Timber Resource in Maryland* report published in 1955.

A sample of 185 of the initial ground plots were visited on the resurvey. Plot centers were relocated, and trees were retallied. The two tallies were reconciled with each other on the plot.

Data from the remeasured plots were used to obtain the first part of a combined estimate of current forest area and timber volume, and estimates of net annual growth, mortality, and timber cut. Regression equations calculated from the remeasured plots brought up to date the volume estimates of the first survey.

On the initial survey, each sawtimber tree was measured for d.b.h., merchantable sawlog height, and number of bolts in the upper stem. These measurements were used with appropriate volume tables for estimating each tree's volume in cubic feet and board feet. On the resurvey, the number of upper-stem bolts were recorded for sawtimber trees on only the remeasured plots. Data from the remeasured plots were developed into gross cubic-foot-volume equations from which volume per tree was obtained. Ratios were used to obtain board-foot volumes.

In addition to the remeasured plots, 535 new ground plots selected from photo plots on the most recent aerial photographs were established. They were selected at random within cubic-foot-volume classes. The data for the photo plots and ground plots based upon the most recent aerial photography were used to obtain the second part of the combined estimates for area and volume.

These two sets of estimates were weighted by their variance reciprocals and combined. This combined result gave the new estimate in acres for each forest area breakdown shown in the tables of this report. The associated sampling errors for these breakdowns were also obtained. The new estimates of timber volumes were produced in the same way.

Estimates of net annual growth, mortality, and timber cut were based entirely upon the 185 remeasured plots. The volume of growing stock on the plots at the time of remeasurement (consisting of both live growing-stock trees and trees that were cut), minus the volume of growing-stock trees on the plots at the time of the first survey, equals net volume growth for the years between measurement.

Stump measurements were used to estimate volumes of cut trees. Measurement of dead trees that were initially classified as live growing-stock trees provided the estimates of mortality.

These estimates for the period between surveys were converted to net annual growth, mortality, and timber cut by dividing by the number of years between measurements for each plot.

Estimates of timber volumes for 1950 were recomputed for more reliable estimates of changes between surveys. The differences between reported and computed volumes for 1950 do not reflect real changes but are the result of differences in volume tables, field interpretations of growing stock, height measurements, and technique errors. The recomputed volume estimates instead of those shown in the 1950 timber resource report were used whenever differences between the two surveys were discussed.

RELIABILITY OF THE ESTIMATES

The forest-area and timber-volume data presented in this report are based on a carefully designed sample of forest conditions throughout Maryland. However, since neither every acre nor every tree in the State was measured, the figures in this report are at best estimates. A measure of the reliability of these estimates is given by a sampling error. Each estimate in this report had a computed sampling error. Included with the statistical tables are the corresponding sampling errors for row totals and column totals.

Briefly, here is how the sampling error indicates reliability. Our report of the total commercial forest area in Maryland, 2,885,000 acres, has an associated sampling error of 1.8 percent (52,000 acres). This means that our best estimates of the commercial forest area in 1964 is 2,885,000 acres. And if there are no errors in procedure, the odds are 2 to 1 that if we repeated the resurvey, the new estimate of commercial forest area would be between 2,833,000 and 2,937,000 acres (2,885,000 ±52,000). Similarly, the odds are 19 to 1 that it would be within ±104,000 acres of the present estimate, and 300 to 1 that it would be within ±156,000 acres.

The computed sampling error is not a complete measure of reliability; there are other sources of error that this term does not include. There could be imperfections in our volume tables and errors in field measurement. Procedural errors were kept to a minimum by careful training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Computed sampling errors for the totals shown in the statistical tables are:

	Sampling error (percent)
Commercial forest area	
(2.9 million acres)	1.8
1.0 million acres	3.0
Growing-stock volume	
(3.0 billion cubic feet)	3.1
1.0 billion cubic feet	5.4
Sawtimber volume	
(6.8 billion board feet)	4.0
Net annual growth	
(94 million cubic feet)	29.0
1.0 billion cubic feet	8.9
Annual timber cut	
(74 million cubic feet)	13.0
1.0 billion cubic feet	3.5

SPECIES TALLIED

Only the commercial trees species[5] found on forest survey sample plots in Maryland are listed below. Other species that are found in Maryland are not included.

Softwoods

Loblolly pine	*Pinus taeda*
Shortleaf pine	*Pinus echinata*
Pitch pine	*Pinus rigida*
Pond pine	*Pinus serotina*
Virginia pine	*Pinus virginiana*
Other eastern softwoods:	
Eastern white pine	*Pinus strobus*
Eastern hemlock	*Tsuga canadensis*
Red spruce	*Picea rubens*
Table-Mountain pine	*Pinus pungens*
Eastern redcedar	*Juniperus virginiana*
Atlantic white-cedar	*Chamaecyparis thyoides*
Baldcypress	*Taxodium distichum*

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[5] Little, Elbert L., Jr. CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). U. S. Dep. Agr., Agr. Handbook 41, 472 pp. 1953.

Hardwoods

Select white oaks:	
White oak	*Quercus alba*
Swamp white oak	*Quercus bicolor*
Bur oak	*Quercus macrocarpa*
Select red oaks:	
Northern red oak	*Quercus rubra*
Other white oaks:	
Chestnut oak	*Quercus prinus*
Overcup oak	*Quercus lyrata*
Post oak	*Quercus stellata*
Other red oaks:	
Southern red oak	*Quercus falcata*
Black oak	*Quercus velutina*
Scarlet oak	*Quercus coccinea*
Pin oak	*Quercus palustris*
Water oak	*Quercus nigra*
Shingle oak	*Quercus imbricaria*
Willow oak	*Quercus phellos*
Hickory	*Carya* species
Soft maples:	
Red maple	*Acer rubrum*
Silver maple	*Acer saccharinum*
American beech	*Fagus grandifolia*
Sweetgum	*Liquidamber styraciflua*
Blackgum	*Nyssa sylvatica*
Yellow-poplar	*Liriodendron tulipifera*
Other eastern hardwoods:	
Sugar maple	*Acer saccharum*
Yellow birch	*Betula alleghaniensis*
Sweet birch	*Betula lenta*
River birch	*Betula nigra*
Butternut	*Juglans cinerea*
Ash	*Fraxinus* species
American basswood	*Tilia americana*
Black cherry	*Prunus serotina*
Black walnut	*Juglans nigra*
American sycamore	*Platanus occidentalis*
Black locust	*Robinia pseudoacacia*
Elm	*Ulmus* species
Sweetbay	*Magnolia virginiana*

STATISTICAL DATA

Tables of statistical data for forest area, timber volume, annual growth, and cut for the entire State (national standard tables) and associated sampling errors for subtotals and totals appear first.

These are followed by a series of tables that give statistics for each of the four geographic units. After the geographic-unit tables are the county statistics.

These county estimates have been prepared for users who wish statistics for a county or group of counties to meet their own particular needs. Estimated sampling errors are shown only for county totals. The users of these data are urged to evaluate the sampling error for each total in relation to their planning needs, use of the data, and decisions based upon these data.

County statistics were computed from means and variances of seven volume strata (stratified from aerial photographs) for each of the geographic units. These were applied to the volume strata within the county, assuming homogeneous forest conditions throughout each stratum. If homogeneity does not exist, the actual errors of some county estimates may be greater than the calculated sampling errors.

Here is an index of the tables that follow:

Statistical Tables for the State

Table No.
1. — Land area by land classes
Commercial forest land:
2. — By ownership classes
3. — By stand-size and ownership classes
4. — By stand-volume classes for sawtimber
5. — By stocking classes based upon alternative components
6. — By stocking classes and stand-size classes
7. — By area-condition and ownership classes
8. — By growth-per-acre and ownership classes
9. — By forest types and ownership classes
10. — Area of noncommercial forest land by forest type
11. — Sampling errors for tables 1 to 9
Number of trees:
12. — Growing stock by diameter classes and species groups
13. — Cull trees and growing stock by diameter groups
Timber volume:
14. — By class of timber and species groups
15. — By ownership classes and species groups
16. — By stand-size classes and species groups
17. — By species and diameter classes (growing stock)
18. — By species and diameter classes (sawtimber)
19. — By species and quality classes
20. — Sampling errors for tables 14 to 18
Growth and annual cut:
21. — By species
22. — By ownership classes (growing stock)
23. — By ownership classes (sawtimber)

Table No.
24. — By components of annual growth
25. — Mortality by species
26. — Mortality by ownership classes
27. — Mortality by causes and species groups
28. — Sampling errors for tables 21 to 27
Timber products and output:
29. — By type of material and species groups
30. — By source and species groups
31. — By products and logging residues (growing stock)
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34. — Timber growth projections to 1994

Statistical Tables for the Geographic Units

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Commercial forest land:
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37. — By stand-size classes
38. — By forest types
Timber volume:
39. — By class of timber
40. — By ownership classes (growing stock)
41. — By ownership classes (sawtimber)
42. — By stand-size classes (growing stock)
43. — By stand-size classes (sawtimber)
— By species and d.b.h. (growing stock) —
44. ——in north-central Maryland
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— By species and d.b.h. (sawtimber) —
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52. — Sampling errors by species and geographic units
Growth and annual cut:
53. — By species (growth of growing stock)
54. — By species (cut of growing stock)
55. — By species (growth of sawtimber)
56. — By species (cut of sawtimber)

Statistical Tables for Individual Counties

57. — Land area by land classes
Commercial forest land:
58. — By ownership classes
59. — By stand-size classes
60. — By stocking percent classes of desirable trees

Table No.
61. — By forest types
Timber volume:
62. — By tree classes and species groups
63. — By stand-size classes
64. — By species (growing stock)
65. — By species (sawtimber)

Table 1.—*Land area of Maryland, by land classes, 1964*

Land class	Area[1]	
	Thousand acres	*Percent*
Commercial forest land	2,885	45.7
Unproductive forest land	43	.7
Productive-reserved forest land	35	.5
Total forest land	2,963	46.9
Nonforest land[2]	3,356	53.1
All land[3]	6,319	100.0

[1] Sampling errors for major breakdowns of area for all tables are given in table 11.

[2] Includes 28,000 acres of water according to survey standards of area classification but defined by the Bureau of Census as land.

[3] Land area from 1959 Census of Agriculture, Volume 1.

Table 2.—*Area of commercial forest land in Maryland, by ownership classes, 1964*

Ownership class	Area	
	Thousand acres	*Percent*
Federal[1]	14	0.5
State	144	5.0
County and municipal	31	1.0
Total public	189	6.5
Forest industry:		
Pulp and paper	33	1.1
Lumber	68	2.4
Total forest industry	101	3.5
Farmer-owned[2]	767	26.6
Miscellaneous private	1,828	63.4
All ownerships	2,885	100.0

[1] There is no National Forest land in Maryland.

[2] Estimate based upon sample plots; not from the Census of Agriculture.

Table 3.—*Area of commercial forest land in Maryland, by stand-size and ownership classes, 1964*
(In thousands of acres)

Stand-size class	All ownerships	Public	Forest industry	Farmer and misc. private
Sawtimber stands	1,793	104	37	1,652
Poletimber stands	754	60	45	649
Sapling-and-seedling stands	298	23	18	257
Nonstocked areas	40	2	1	37
All classes	2,885	189	101	2,595

Table 4.—*Area of commercial forest land in Maryland, by stand-volume classes for sawtimber and other stand-size classes, 1964*
(In thousands of acres)

Stand volumes per acre[1]	Area by stand-size classes		
	All stands	Sawtimber stands	Other stands
Less than 1,500 board feet	1,406	406	1,000
1,500 to 5,000 board feet	1,026	934	92
More than 5,000 board feet	453	453	—
All classes	2,885	1,793	1,092

[1] Net volume, International ¼-inch rule.

Table 5.—*Area of commercial forest land in Maryland, by stocking classes based on alternative stand components, 1964*
(In thousands of acres)

Stocking (percent)	Stocking classified in terms of—		
	All trees	Growing-stock trees	Desirable trees
90 to 100	1,091	194	28
80 to 90	976	566	9
70 to 80	441	659	28
60 to 70	166	627	52
50 to 60	96	354	300
40 to 50	42	212	163
30 to 40	19	161	234
20 to 30	21	40	414
10 to 20	33	32	389
Less than 10	—	40	1,268
All areas	2,885	2,885	2,885

Table 6.—*Area of commercial forest land in Maryland, by stocking classes of growing-stock trees and by stand-size classes, 1964*

(In thousands of acres)

Stocking class[1] (percent)	All stands	Saw-timber stands	Pole-timber stands	Sapling-and-seedling stands	Non-stocked areas
70 or more	1,419	991	336	92	—
40 to 70	1,193	705	312	176	—
10 to 40	233	97	106	30	—
Less than 10	40	—	—	—	40
All classes	2,885	1,793	754	298	40

[1] In terms of growing-stock trees.

Table 7.—*Area of commercial forest land in Maryland, by area-condition and ownership classes, 1964*

(In thousands of acres)

Area-condition class	All ownerships	Public	Forest industry	Farmer and misc. private
1	65	—	9	56
2	10	—	—	10
3	505	7	19	479
4	54	—	—	54
5	2,251	182	73	1,996
All classes	2,885	189	101	2,595

Table 8.—*Area of commercial forest land in Maryland, by growth-per-acre and ownership classes, 1964*

(In thousands of acres)

Growth-per-acre class (cubic feet)	All ownerships	Public	Forest industry	Farmer and misc. private
85 to 120	50	—	—	50
50 to 85	292	43	14	235
Less than 50	2,543	146	87	2,310
All classes	2,885	189	101	2,595

Table 9.—*Area of commercial forest land in Maryland, by forest types and ownership classes, 1964*
(In thousands of acres)

Forest type	All ownerships	Public ownerships	Private ownerships
White-red pine	39	7	32
Spruce-fir	12	—	12
Loblolly-shortleaf pine	598	6	592
Oak-pine	299	35	264
Oak-hickory	1,416	108	1,308
Oak-gum-cypress	340	13	327
Elm-ash-cottonwood	130	10	120
Maple-beech-birch	41	10	31
Aspen-birch	10	—	10
All types	2,885	189	2,696

Table 10.—*Area of noncommercial forest land in Maryand by forest type, 1964*
(In thousands of acres)

Forest type	All areas	Productive-reserved areas	Unproductive areas
Loblolly-shortleaf pine	11	1	10
Oak-hickory	37	33	4
Oak-gum-cypress	30	1	29
All types	78	35	43

Table 11.—*Sampling errors, in percent, for major area breakdowns in Maryland, 1964*

Table No.	Area breakdown classification	Sampling error
1	Forest-land area:	
	Commercial	2
	Unproductive	2
	Total	2
2	Ownership[1]:	
	Farmer-owned	10
	Misc. private	5
	Farmer and misc. private	2
3	Stand-size class:	
	Sawtimber	5
	Poletimber	10
	Sapling and seedling	17
	Nonstocked	*
4	Stand-volume per acre:	
	Less than 1,500 board feet	15
	1,500 to 5,000 board feet	9
	More than 5,000 board feet	13
6	Stocking class:	
	70 percent or more	6
	40 to 70 percent	7
	10 to 40 percent	21
	Less than 10 percent	*
7	Area-condition class:	
	1	37
	2	**
	3	13
	4	43
	5	4
8	Growth-per-acre class:	
	85 to 120 cubic feet	*
	50 to 85 cubic feet	25
	Less than 50 cubic feet	23
9	Forest types:	
	White-red pine	*
	Spruce-fir	**
	Loblolly-shortleaf pine	11
	Oak-pine	18
	Oak-hickory	8
	Oak-gum-cypress	17
	Elm-ash-cottonwood	28
	Maple-beech-birch	15
	Aspen-birch	**

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[1] There are no sampling errors for areas in public ownership whose acreages were obtained from public records, nor for forestry industry whose acreages were obtained directly.

* Sampling error of 50 to 99 percent.

** Sampling error of 100 percent or higher.

Table 12.—*Number of growing-stock trees on commercial forest land in Maryland, by diameter classes and by softwoods and hardwoods, 1964*

(In thousands of trees)

D.b.h. class (inches)	All species	Softwood	Hardwood
1.0 - 2.9	438,616	173,949	264,667
3.0 - 4.9	229,763	77,656	152,107
5.0 - 6.9	146,734	34,443	112,291
7.0 - 8.9	85,112	22,873	62,239
9.0 - 10.9	50,575	11,615	38,960
11.0 - 12.9	23,470	5,935	17,535
13.0 - 14.9	14,694	2,435	12,259
15.0 - 16.9	8,237	1,580	6,657
17.0 - 18.9	4,678	614	4,064
19.0 - 28.9	5,067	392	4,675
29.0 and larger	402	—	402
All classes	1,007,348	331,492	675,856

Table 13.—*Number of cull and growing-stock trees on commercial forest land in Maryland, by diameter groups and by softwoods and hardwoods, 1964*

(In thousands of trees)

D.b.h. class (inches)	All trees [1]	Cull trees	Growing-stock trees
Softwoods:			
5.0 to 8.9	59,355	2,039	57,316
9.0 to 18.9	23,421	1,242	22,179
19.0 and larger	427	35	392
Total	83,203	3,316	79,887
Hardwoods:			
5.0 to 10.9	239,706	26,216	213,490
11.0 to 18.9	48,271	7,756	40,515
19.0 and larger	6,080	1,003	5,077
Total	294,057	34,975	259,082
All species	377,260	38,291	338,969

[1] The number of salvable dead trees is negligible in Maryland; therefore this item is omitted from this table.

Table 14.—*Volume of timber on commercial forest land in Maryland, by class of timber and by softwoods and hardwoods, 1964*
(In millions of cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Sawlog portion	1,498	381	1,117
Upper-stem portion	275	52	223
Total	1,773	433	1,340
Poletimber trees	1,188	199	989
All growing-stock trees	2,961	632	2,329
Sound cull trees:			
Sawtimber size	85	6	79
Poletimber size	45	3	42
Total	130	9	121
Rotten cull trees:			
Sawtimber size	48	2	46
Poletimber size	11	—	46
Total	59	2	57
Total, all timber	3,150	643	2,507

Table 15.—*Volume of growing stock and sawtimber on commercial forest land in Maryland, by ownership classes and by softwoods and hardwoods, 1964*

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
		Million cubic feet			*Million board feet* [1]	
Public	186	25	161	344	58	286
Forest industry	116	56	60	179	125	54
Other private	2,659	551	2,108	6,300	1,324	4,976
All ownerships	2,961	632	2,329	6,823	1,507	5,316

[1] International ¼-inch rule.

Table 16.—*Volume of growing stock and sawtimber on commercial forest land in Maryland, by stand-size classes and by softwoods and hardwoods, 1964*

Stand-size class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
		Million cubic feet			*Million board feet* [1]	
Sawtimber stands	2,330	496	1,834	6,197	1,352	4,845
Poletimber stands	594	127	467	543	129	414
Sapling-and-seedling stands	37	9	28	83	26	57
Nonstocked areas	—	—	—	—	—	—
Total	2,961	632	2,329	6,823	1,507	5,316

[1] International ¼-inch rule.

Table 17.—*Volume of growing stock on commercial forest land in Maryland, by species and diameter classes, 1964*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Shortleaf-loblolly pines	367	30	68	80	65	46	38	16	24	—
Virginia pine	228	28	52	53	48	19	22	4	2	—
Other softwoods	37	9	12	4	4	1	2	3	2	—
Total softwoods	632	67	132	137	117	66	62	23	28	—
Select white oaks	312	30	44	65	30	45	30	20	41	7
Select red oaks	176	17	19	19	29	31	17	21	20	3
Other white oaks	182	30	26	34	21	22	15	14	16	4
Other red oaks	399	33	61	70	52	54	37	29	47	16
Hickory	100	14	14	14	12	22	8	9	7	—
Soft maples	133	39	34	28	10	7	6	3	5	1
Beech	69	7	9	12	6	9	6	4	16	—
Sweetgum	209	26	27	47	37	22	27	11	12	—
Blackgum	102	14	12	16	21	18	7	7	6	1
Ash, walnut, cherry	76	13	16	13	14	6	6	3	5	—
Yellow-poplar	378	14	23	36	26	53	58	55	93	20
Other hardwoods	193	34	40	39	32	12	10	8	18	—
Total hardwoods	2,329	271	325	393	290	301	227	184	286	52
All species	2,961	338	457	530	407	367	289	207	314	52

Table 18.—*Volume of sawtimber on commercial forest land in Maryland, by species and diameter classes, 1964*

(In millions of board feet)[1]

Species	All classes	Diameter class (inches at breast height)					
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger

Species	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Shortleaf-loblolly pines	945	260	212	163	142	66	102	—
Virginia pine	504	168	159	66	84	16	11	—
Other softwoods	58	13	14	3	8	11	9	—
Total softwoods	1,507	441	385	232	234	93	122	—
Select white oaks	707	—	109	174	118	82	185	39
Select red oaks	475	—	102	121	71	85	84	12
Other white oaks	366	—	74	82	61	60	71	18
Other red oaks	944	—	188	208	148	124	204	72
Hickory	224	—	42	84	28	41	29	—
Soft maples	123	—	35	28	23	14	20	3
Beech	162	—	18	33	24	17	68	2
Sweetgum	431	—	133	84	106	51	57	—
Blackgum	220	—	72	65	25	28	26	4
Ash, walnut, cherry	122	—	46	23	21	12	20	—
Yellow-poplar	1,237	—	94	201	231	229	397	85
Other hardwoods	305	—	114	45	39	33	74	—
Total hardwoods	5,316	—	1,027	1,148	895	776	1,235	235
All species	6,823	441	1,412	1,380	1,129	869	1,357	235

[1] International ¼-inch rule.

Table 19.—*Volume of sawtimber on commercial forest land in Maryland, by species and quality classes, 1964*

(In millions of board feet) [1]

Species	All classes	Standard-lumber logs			Tie-and-timber logs [2]
		Grade 1	Grade 2	Grade 3	
Softwoods:					
Yellow pines	1,449	44	204	1,201	—
Other softwoods [3]	58	—	—	—	—
Total	1,507	44	204	1,201	—
Hardwoods:					
Select white oaks	707	77	115	222	293
Select red oaks	475	60	80	176	159
Other white oaks	366	22	52	117	175
Other red oaks	944	46	121	264	513
Hickory	224	12	24	85	103
Soft maples	123	3	31	49	40
Sweetgum	431	26	83	152	170
Ash, walnut, cherry	122	9	21	48	44
Yellow-poplar	1,237	227	292	377	341
Other hardwoods	687	35	118	291	243
Total	5,316	517	937	1,781	2,081
All species	6,823	561	1,141	2,982	2,081

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[1] International ¼-inch rule.

[2] Meet minimum specifications for hardwood tie-and-timber logs but not for standard-lumber logs; not applicable to softwoods.

[3] Hemlock, spruce, and miscellaneous softwoods were not graded into standard-lumber logs.

Table 20.—*Sampling errors, in percent, for major timber volume breakdowns in Maryland, 1964*

Table No.	Volume breakdown classification	Sampling errors
		Percent
14	Class of timber:	
	Softwood growing stock	10
	Hardwood growing stock	4
	Sawtimber trees	4
	Poletimber trees	5
	All growing stock	3
	Sound cull trees	10
	Rotten cull trees	12
	All live trees	3
15	Ownership classes:	
	Growing stock	
	Other public	19
	Forest industry	36
	Farmer and misc. private	4
	Sawtimber	
	Other public	22
	Forest industry	45
	Farmer and misc. private	5
	Softwood sawtimber	12
	Hardwood sawtimber	5
	All sawtimber	4
16	Stand-size classes:	
	Growing stock	
	Sawtimber stands	4
	Poletimber stands	12
	Sapling and seedling stands	27
	Sawtimber	
	Sawtimber stands	4
	Poletimber stands	17
	Sapling and seedling stands	39

Table No.	Volume breakdown classification	Sampling errors Cu. ft.	Sampling errors Bd. ft.
		Percent	
17-18	Species:		
	Shortleaf and loblolly pines	12	14
	Virginia pine	18	22
	Other softwoods	30	32
	Select white oaks	11	13
	Select red oaks	12	13
	Other white oaks	19	33
	Other red oaks	10	12
	Hickory	16	22
	Soft maples	10	17
	Beech	19	23
	Sweetgum	12	15
	Blackgum	16	18
	Ash, walnut, cherry	24	24
	Yellow-poplar	14	15
	Other hardwoods	12	17
17-18	Diameter classes: (inches)		
	5.0- 6.9	7	—
	7.0- 8.9	6	—
	9.0-10.9[1]	6	17
	11.0-12.9	6	7
	13.0-14.9	7	7
	15.0-16.9	7	7
	17.0-18.9	10	9
	19.0-28.9	7	7
	29.0 and larger	20	21

[1] Board-foot sampling error for this class is for softwoods only.

Table 21.—*Net annual growth and annual cut of growing stock and sawtimber on commercial forest land in Maryland, by species, 1963*

Species	Growing Stock		Sawtimber	
	Net annual growth	Annual timber cut	Net annual growth	Annual timber cut
	Thousand cubic feet		*Thousand board feet*[1]	
Softwoods:				
Yellow pines	20,220	27,950	58,612	96,858
Other softwoods	170	150	513	—
Total	20,390	28,100	59,125	96,858
Hardwoods:				
Select oak species	15,598	10,895	46,489	39,679
Other oaks	15,000	7,204	47,896	21,437
Hickory	2,893	1,315	5,855	4,529
Sugar maple	565	733	948	1,555
Sweetgum	6,970	2,189	16,035	2,527
Soft maples	5,114	2,996	5,214	4,257
Ash, walnut, cherry	2,386	762	4,858	2,105
Yellow-poplar	13,882	12,284	56,517	43,137
Other hardwoods	10,864	7,348	26,188	17,580
Total	73,272	45,726	210,000	136,806
All species	93,662	73,826	269,125	233,664

[1] International ¼-inch rule.

Sampling errors for tables 21 through 27 are shown in table 28.

Table 22.—*Net annual growth and annual cut of growing stock on commercial forest land in Maryland, by ownership classses, and by softwoods and hardwoods, 1963*

(In thousands of cubic feet)

Ownership class	Net annual growth			Annual timber cut		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Public	5,953	422	5,531	746	—	746
Forest industry	1,548	1,184	364	5,917	4,727	1,190
Farmer and misc. private	86,161	18,784	67,377	67,163	23,373	43,790
All ownerships	93,662	20,390	73,272	73,826	28,100	45,726

Table 23.—*Net annual growth and annual cut of sawtimber on commercial forest land in Maryland, by ownership classes, and by softwoods and hardwoods, 1963*

(In thousands of board feet) [1]

Ownership class	Net annual growth			Annual timber cut		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Public	17,095	1,514	15,581	3,391	—	3,391
Forest industry	5,516	4,759	757	21,853	18,968	2,885
Farmer and misc. private	246,514	52,852	193,662	208,420	77,890	130,530
All ownerships	269,125	59,125	210,000	233,664	96,858	136,806

[1] International ¼-inch rule.

Table 24.—*Components of net annual growth of growing stock and sawtimber on commercial forest land in Maryland, by species group, 1963*

Components	All species	Softwoods	Hardwoods
	GROWING STOCK *Thousands of cubic feet*		
Growth on initial growing stock [1]	56,601	14,273	42,328
Ingrowth—saplings that became poletimber	50,863	9,902	40,961
Gross growth	107,464	24,175	83,289
Annual mortality	13,802	3,785	10,017
Net annual growth of growing stock	93,662	20,390	73,272
	SAWTIMBER *Thousands of board feet* [2]		
Growth on initial sawtimber inventory [1]	148,558	24,090	124,468
Ingrowth—poletimber trees that became sawtimber	141,549	39,825	101,724
Gross growth	290,107	63,915	226,192
Annual mortality	20,982	4,790	16,192
Net annual growth of sawtimber	269,125	59,125	210,000

[1] Including growth on trees that were cut.
[2] International ¼-inch rule.

Table 25.—*Annual mortality of growing stock and sawtimber on commercial forest land in Maryland, by species, 1963*

Species	Growing stock	Sawtimber
	Thousand cubic feet	*Thousand board feet* [1]
Softwoods:		
Yellow pines	3,677	4,689
Other softwoods	108	101
Total	3,785	4,790
Hardwoods:		
Select oaks	2,477	4,660
Other oaks	1,804	893
Hickory	972	2,968
Soft maples	604	1,121
Sweetgum	948	386
Ash, walnut, cherry	169	653
Yellow-poplar	298	—
Other hardwoods	2,745	5,511
Total	10,017	16,192
All species	13,802	20,982

[1] International ¼-inch rule.

Table 26.—*Annual mortality of growing stock and sawtimber on commercial forest land in Maryland, by ownership classes and by softwoods and hardwoods, 1963*

Ownership	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			*Thousand board feet* [1]		
Public	1,313	168	1,145	1,572	92	1,480
Forest industry	1,128	422	706	982	635	347
Farmer and misc. private	11,361	3,195	8,166	18,428	4,063	14,365
All ownerships	13,802	3,785	10,017	20,982	4,790	16,192

[1] International ¼-inch rule.

Table 27.—*Annual mortality of growing stock and sawtimber on commercial forest land in Maryland, by causes and by softwoods and hardwoods, 1963*

Cause of death	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			*Thousand board feet* [1]		
Fire	—	—	—	—	—	—
Insects	618	353	265	1,779	663	1,116
Diseases	3,411	794	2,617	5,410	853	4,557
Other	5,578	1,596	3,982	9,479	2,680	6,799
Unknown	4,195	1,042	3,153	4,314	594	3,720
All causes	13,802	3,785	10,017	20,982	4,790	16,192

[1] International ¼-inch rule.

Table 28.—*Sampling errors, in percent, for major breakdowns of annual growth, cut, and mortality of growing stock and sawtimber, Maryland, 1963*

Table No.	Breakdown classification	Sampling error	
		Percent	
21	Growth in cubic feet:		
	Softwoods	17	
	Hardwoods	37	
	All species	29	
	Cut in cubic feet:		
	Softwoods	19	
	Hardwoods	18	
	All species	13	
	Growth in board feet:		
	Softwoods	16	
	Hardwoods	17	
	All species	12	
	Cut in board feet:		
	Softwoods	20	
	Hardwoods	20	
	All species	15	
22	Growth in cubic feet:		
	Public	33	
	Forest industry	56	
	Farmer and misc. private	34	
	Cut in cubic feet:		
	Public	58	
	Forest industry	39	
	Farmer and misc. private	15	
23	Growth in board feet:		
	Public	39	
	Forest industry	55	
	Farmer and misc. private	13	
	Cut in board feet:		
	Public	67	
	Forest industry	38	
	Farmer and misc. private	16	
25	Mortality by species group:		
		Cu. ft.	*Bd. ft.*
	Softwoods	25	36
	Hardwoods	18	29
	All species	14	23
26	Mortality by owner:		
	Public	47	70
	Forest industry	37	66
	Farmer and misc. private	17	26
27	Mortality by cause:		
	Fire	—	—
	Insect	49	66
	Disease	41	41
	Other	21	33
	Unknown	20	60

Table 29.—*Total output of timber products, by products, by type of material used, and by softwoods and hardwoods, Maryland, 1963*

Product and species group	Total output in standard units		Output from roundwood		Output from plant byproducts (standard units)
	Units	Number	Standard units	M cubic feet	
Sawlogs:					
Softwood	M board feet [1]	73,023	73,023	13,469	—
Hardwood	M board feet [1]	117,168	117,168	23,403	—
Total	M board feet [1]	190,191	190,191	36,872	—
Veneer logs and bolts:					
Softwood	M board feet	1,035	1,035	222	—
Hardwood	M board feet	14,891	14,891	3,375	—
Total	M board feet	15,926	15,926	3,597	—
Cooperage logs and bolts:					
Softwood	M board feet	360	360	63	—
Hardwood	M board feet	6,840	6,840	1,375	—
Total	M board feet	7,200	7,200	1,438	—
Pulpwood:					
Softwood	Standard Cords [2]	108,200	72,500	5,800	35,700
Hardwood	Standard Cords [2]	75,388	65,488	5,239	9,900
Total	Standard Cords [2]	183,588	137,988	11,039	45,600
Piling:					
Softwood	M linear feet	5,945	5,945	3,567	—
Hardwood	M linear feet	1,305	1,305	927	—
Total	M linear feet	7,250	7,250	4,494	—
Poles:					
Softwood	M pieces	7	7	80	—
Hardwood	M pieces	—	—	—	—
Total	M pieces	7	7	80	—
Mine timbers (rounds):					
Softwood	M cubic feet	—	—	—	—
Hardwood	M cubic feet	48	48	48	—
Total	M cubic feet	48	48	48	—
Miscellaneous industrial wood:[3]					
Softwood	M cubic feet	—	—	—	—
Hardwood	M cubic feet	471	428	428	43
Total	M cubic feet	471	428	428	43

CONTINUED

TABLE 29.—CONTINUED

Product and species group	Total output in standard units		Output from roundwood		Output from plant byproducts (standard units)
	Units	Number	Standard units	M cubic feet	
Posts (round and split):					
Softwood	M pieces	3	3	3	—
Hardwood	M pieces	157	157	155	—
Total	M pieces	160	160	158	—
Fuelwood:					
Softwood	Standard Cords	20,675	9,987	799	10,688
Hardwood	Standard Cords	87,450	56,663	4,533	30,787
Total	Standard Cords	108,125	66,650	5,332	41,475
All products:[4]					
Softwood	M cubic feet	27,714	24,003	24,003	3,711
Hardwood	M cubic feet	42,781	39,483	39,483	3,298
Total	M cubic feet	70,495	63,486	63,486	7,009

[1] International ¼-inch rule.

[2] Rough wood basis (for example, chips converted to equivalent standard cords).

[3] Includes hewn ties, excelsior bolts, shingle bolts, turnery bolts, chemical wood, and the like.

[4] Does not include 4,944,000 cubic feet of residues used for agricultural bedding.

Table 30.—*Total output of roundwood products, by source and by softwoods and hardwoods, Maryland, 1963*

(In thousands of cubic feet)

Source	All species	Softwoods	Hardwoods
Growing-stock trees [1]			
Sawtimber trees	52,313	21,444	30,869
Poletimber trees	6,650	1,587	5,063
Total	58,963	23,031	35,932
Cull trees [1]	168	—	168
Salvable dead trees [1]	242	100	142
Other sources [2]	4,113	872	3,241
All sources	63,486	24,003	39,483

[1] On commercial forest land.

[2] Includes noncommercial forest land, nonforest land such as fence rows, trees less than 5.0 inches in diameter, and tree tops and limbs.

Table 31.—*Annual timber cut from growing stock on commercial forest lands, by products and logging residues, and by softwoods and hardwoods, Maryland, 1963*

(In thousands of cubic feet)

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	36,139	13,151	22,988
Veneer logs and bolts	3,525	217	3,308
Cooperage logs and bolts	1,413	63	1,350
Pulpwood	9,772	5,459	4,313
Piling	4,494	3,567	927
Poles	80	80	—
Mine timbers	40	—	40
Miscellaneous industrial wood	362	—	362
Posts	138	3	135
Fuelwood	3,000	491	2,509
All products	58,963	23,031	35,932
Logging residues	14,863	5,069	9,794
Timber cut	73,826	28,100	45,726

Table 32.—*Annual timber cut from live sawtimber on commercial forest lands, by products and logging residues, and by softwoods and hardwoods, Maryland, 1963*

(In thousands of board feet) [1]

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	151,039	53,701	97,338
Veneer logs and bolts	14,898	889	14,009
Cooperage logs and bolts	5,978	270	5,708
Pulpwood	29,276	21,308	7,968
Piling	18,489	14,565	3,924
Poles	328	328	—
Mine timbers	63	—	63
Miscellaneous industrial wood	565	—	565
Posts	221	11	210
Fuelwood	3,534	859	2,675
All products	224,391	91,931	132,460
Logging residues	9,273	4,927	4,346
Timber cut	233,664	96,858	136,806

[1] International ¼-inch rule.

Table 33.—*Volume of plant residues by industrial source and type of residue, and by softwoods and hardwoods, Maryland, 1963*

(In thousands of cubic feet)

Industrial Source	Species and character of residues								
	All species			Softwoods			Hardwoods		
	Total	Course[1]	Fine[2]	Total	Course	Fine	Total	Course	Fine
Lumber industry	4,954	3,592	1,362	401	234	167	4,553	3,358	1,195
Other primary industries[3]	328	135	193	—	—	—	328	135	193
All industries	5,282	3,727	1,555	401	234	167	4,881	3,493	1,388

[1] Unused material suitable for chipping, such as slabs, edgings, and veneer cores.
[2] Unused material not suitable for chipping, such as sawdust and shavings.
[3] Includes a negligible volume of plant residues from the veneer industry.

Table 34.—*Timber growth projections for Maryland, 1963*[1]

Year	Assumed cut			Projected growth		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
GROWING STOCK (In millions of cubic feet)						
1963*	73.8	28.1	45.7	93.7	20.4	73.3
1973	73.1	28.6	44.5	81.3	16.4	64.9
1983	66.1	20.4	45.7	79.2	14.3	64.9
1993	60.4	13.4	47.0	78.8	13.4	65.4
SAWTIMBER (In millions of board feet)[2]						
1963	234	97	137	269	59	210
1973	229	83	146	250	43	207
1983	206	54	152	268	35	233
1993	193	34	159	290	32	258

[1] Based upon the following assumptions: (a) that the difference between annual growth and timber cut for softwoods will steadily diminish until growth and cut are equal; (b) that the trend level cut for hardwoods between 1950 and 1963 will hold constant; and (c) that the current trend in forest management and programs will continue.

[2] International ¼-inch rule.

* Year of inventory.

Table 35.—*Land area of Maryland by land classes and geographic units, 1964*

(In thousands of acres)

Land class	North-central	Southern	Southern Eastern Shore	Western	State total
Commercial forest land	1,419.6	434.2	541.5	490.2	2,885.5
Unproductive forest land	31.0	1.5	10.5	.3	43.3
Productive-reserved forest land	30.3	.3	1.0	3.5	35.1
Total forest land	1,480.9	436.0	553.0	494.0	2,963.9
Nonforest land	2,338.0	232.2	583.0	202.3	3,355.5
All land	3,818.9	668.2	1,136.0	696.3	6,319.4
Sampling errors, in percent					
Commercial forest land	3.0	4.4	3.0	3.8	1.8

Table 36.—*Area of commercial forest land in Maryland, by ownership classes and geographic units 1964*

(In thousands of acres)

Ownership class	North-Central	Southern	Southern Eastern Shore	Western	State total
Federal	11.3	2.6	0	0	13.9
State	13.6	3.9	16.1	110.7	144.3
County and municipal	28.8	0	0	2.3	31.1
Forest industry:					
Pulp and paper	3.7	5.1	24.3	0	33.1
Lumber	1.2	1.7	54.6	10.2	67.7
Total forest industry	4.9	6.8	78.9	10.2	100.8
Farmer-owned	364.4	137.4	144.9	120.0	766.7
Miscellaneous private	996.6	283.5	301.6	247.0	1,828.7
All ownerships	1,419.6	434.2	541.5	490.2	2,885.5
	Sampling errors, in percent [1]				
Farmer-owned	16	26	16	35	10
Miscellaneous private	7	10	13	16	5

[1] Public ownership and forest industry ownership data were taken from records, and therefore had no sampling errors.

Table 37.—*Area of commercial forest land in Maryland, by stand-size classes and geographic units, 1964*

(In thousands of acres)

Stand-size class	North-central	Southern	Southern Eastern Shore	Western	State total
Sawtimber stands	982.1	281.2	327.2	202.9	1,793.4
Poletimber stands	301.0	81.6	171.0	200.3	753.9
Sapling-and-seedling stands	124.7	64.2	32.7	76.1	297.7
Nonstocked areas	11.8	7.2	10.6	10.9	40.5
All classes	1,419.6	434.2	541.5	490.2	2,885.5
	Sampling errors, in percent				
Sawtimber stands	6	12	11	17	5
Poletimber stands	18	28	20	17	10
Sapling-and-seedling stands	26	40	*	34	17
Nonstocked areas	**	**	**	**	**

* Sampling error is between 50 and 99 percent.

** Sampling error is 100 percent and over.

Table 38.—*Area of commercial forest land in Maryland, by forest types and geographic units, 1964*

(In thousands of acres)

Forest type	North-central	Southern	Southern Eastern Shore	Western	State total
Yellow pines	181.1	156.9	260.1	—	598.1
Oak-pine	131.0	59.5	74.1	34.4	299.0
Oak-hickory	824.3	145.6	77.7	368.7	1,416.3
Oak-gum	173.1	62.8	93.1	10.6	339.6
Elm-ash-red maple	84.8	9.4	31.2	4.9	130.3
Maple-beech	3.2	—	5.3	33.1	41.6
Misc. types	22.1	—	—	38.5	60.6
All types	1,419.6	434.2	541.5	490.2	2,885.5
		Sampling errors, in percent			
Yellow pines	24	21	14	—	11
Oak-pine	30	36	34	*	18
Oak-hickory	12	30	32	9	8
Oak-gum	25	32	30	*	17
Elm-ash-red maple	35	**	*	40	28
Maple-beech	—	—	—	47	47
Misc. types	**	—	—	*	*

* Sampling error is between 50 and 99 percent.

** Sampling error is 100 percent and over.

Table 39.—*Volume of timber on commercial forest land in Maryland, by class of timber and geographic units, 1964*
(In millions of cubic feet)

Class of timber	North-central	Southern	Southern Eastern Shore	Western	State total
Sawtimber trees:					
Sawlog portion	849.9	238.2	269.3	140.5	1,497.9
Upper-stem portion	156.0	43.4	46.2	30.0	275.6
Total	1,005.9	281.6	315.5	170.5	1,773.5
Poletimber trees	480.6	146.1	265.1	295.8	1,187.6
All growing-stock trees	1,486.5	427.7	580.6	466.3	2,961.1
Sound cull trees:					
Sawtimber size	35.7	17.9	21.6	9.8	85.0
Poletimber size	26.8	9.0	4.5	4.8	45.1
Total	62.5	26.9	26.1	14.6	130.1
Rotten cull trees:					
Sawtimber size	20.7	4.6	8.6	13.8	47.7
Poletimber size	4.9	.9	2.6	2.6	11.0
Total	25.6	5.5	11.2	16.4	58.7
Total, all timber	1,574.6	460.1	617.9	497.3	3,149.9
	Sampling errors, in percent				
Sawtimber trees	6	7	9	10	4.1
Poletimber trees	9	11	10	8	4.7
All growing-stock trees	5	6	6	5	3.1
Sound cull trees	15	21	24	26	10.1
Rotten cull trees	18	27	29	21	11.5

Table 40.—*Volume of growing stock on commercial forest land in Maryland, by ownership classes, softwoods and hardwoods, and geographic units, 1964*
(In millions of cubic feet)

Ownership and species group	North-central	Southern	Southern Eastern Shore	Western	State total
Public:					
Softwoods	11.2	—	0.7	12.9	24.8
Hardwoods	47.0	—	6.1	108.3	161.4
Total	58.2	—	6.8	121.2	186.2
Forest industry:					
Softwoods	—	0.3	56.1	—	56.4
Hardwoods	14.2	—	17.6	27.9	59.7
Total	14.2	.3	73.7	27.9	116.1
Other private:					
Softwoods	173.9	122.8	231.0	22.9	550.6
Hardwoods	1,240.2	304.6	269.1	294.3	2,108.2
Total	1,414.1	427.4	500.1	317.2	2,658.8
All ownerships:					
Softwoods	185.1	123.1	287.8	35.8	631.8
Hardwoods	1,301.4	304.6	292.8	430.5	2,329.3
Total	1,486.5	427.7	580.6	466.3	2,961.1
	Sampling errors, in percent				
Total line only, for:					
Public	39	—	**	20	19
Forest industry	**	**	46	*	36
Other private	6	6	9	16	4

* Sampling error is between 50 and 99 percent.
** Sampling error is 100 percent and over.

Table 41.—*Volume of sawtimber on commercial forest land in Maryland, by ownership classes, softwoods and hardwoods, and geographic units, 1964*
(In millions of board feet)

Ownership and species group	North-central	Southern	Southern Eastern Shore	Western	State total
Public:					
Softwoods	29.6	—	2.7	25.5	57.8
Hardwoods	100.6	—	22.4	163.4	286.4
Total	130.2	—	25.1	188.9	344.2
Forest industry:					
Softwoods	—	—	125.4	—	125.4
Hardwoods	22.9	—	1.9	29.0	53.8
Total	22.9	—	127.3	29.0	179.2
Other private:					
Softwoods	446.3	303.3	554.0	19.6	1,323.2
Hardwoods	3,339.2	787.8	440.6	408.5	4,976.1
Total	3,785.5	1,091.1	994.6	428.1	6,299.3
All ownerships:					
Softwoods	475.9	303.3	682.1	45.1	1,506.4
Hardwoods	3,462.7	787.8	464.9	600.9	5,316.3
Total	3,938.6	1,091.1	1,147.0	646.0	6,822.7
	Sampling errors, in percent				
Total line only, for:					
Public	42	—	**	23	22
Forest industry	**	—	*	*	45
Other private	6	7	12	20	5

* Sampling error is between 50 and 99 percent.
** Sampling error is 100 percent and over.

Table 42.—*Volume of growing stock on commercial forest land in Maryland, by stand-size classes, softwoods and hardwoods, and geographic units, 1964*

(In millions of cubic feet)

Stand-size class and species group	North-central	Southern	Southern Eastern Shore	Western	State total
Sawtimber stands:					
Softwoods	148.2	100.1	235.5	12.1	495.9
Hardwoods	1,148.3	247.7	199.1	239.0	1,834.1
Total	1,296.5	347.8	434.6	251.1	2,330.0
Poletimber stands:					
Softwoods	35.6	21.2	46.3	23.7	126.8
Hardwoods	143.2	51.6	89.3	182.9	467.0
Total	178.8	72.8	135.6	206.6	593.8
Other stands:					
Softwoods	1.3	1.8	6.0	—	9.1
Hardwoods	9.9	5.3	4.4	8.6	28.2
Total	11.2	7.1	10.4	8.6	37.3
All stands:					
Softwoods	185.1	123.1	287.8	35.8	631.8
Hardwoods	1,301.4	304.6	292.8	430.5	2,329.3
Total	1,486.5	427.7	580.6	466.3	2,961.1
	Sampling errors, in percent				
Total line only, for:					
Sawtimber stands	6	9	10	17	4
Poletimber stands	24	32	25	21	12
Other stands	46	*	*	44	27
All stands:					
Softwoods	24	21	13	31	10.2
Hardwoods	6	10	13	6	4.2
Total	5	6	6	5	3.1

* Sampling error is between 50 and 99 percent.

Table 43.—*Volume of sawtimber on commercial forest land in Maryland, by stand-size classes, softwoods and hardwoods, and geographic units 1964*

(In millions of board feet)

Stand-size class and species group	North-central	Southern	Southern Eastern Shore	Western	State total
Sawtimber stands:					
Softwoods	451.7	267.8	600.5	31.9	1,351.9
Hardwoods	3,277.6	719.7	387.4	460.6	4,845.3
Total	3,729.3	987.5	987.9	492.5	6,197.2
Poletimber stands:					
Softwoods	24.2	33.8	57.9	13.2	129.1
Hardwoods	158.5	56.6	71.1	128.0	414.2
Total	182.7	90.4	129.0	141.2	543.3
Other stands:					
Softwoods	—	1.7	23.7	—	25.4
Hardwoods	26.6	11.5	6.4	12.3	56.8
Total	26.6	13.2	30.1	12.3	82.2
All stands:					
Softwoods	475.9	303.3	682.1	45.1	1,506.4
Hardwoods	3,462.7	787.8	464.9	600.9	5,316.3
Total	3,938.6	1,091.1	1,147.0	646.0	6,822.7
	Sampling errors, in percent				
Total line only, for:					
Sawtimber stands	6	8	10	13	4
Poletimber stands	29	43	33	35	17
Other stands	*	*	*	*	39
All stands:					
Softwoods	28	22	14	36	11.9
Hardwoods	7	11	19	9	5.3
Total	6	7	8	9	4.0

* Sampling error is between 50 and 99 percent.

Table 44.—*Volume of growing stock on commercial forest land in north-central Maryland, by species and diameter classes, 1964*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Shortleaf-loblolly pines	63.9	3.0	2.9	8.5	12.9	13.1	14.8	4.6	4.1	—
Virginia pine	110.6	15.1	24.4	19.5	21.5	10.5	14.2	3.8	1.6	—
Other softwoods	10.6	1.4	1.3	1.8	2.5	1.0	1.0	.9	.7	—
Total softwoods	185.1	19.5	28.6	29.8	36.9	24.6	30.0	9.3	6.4	—
Select white oaks	154.8	7.8	17.5	22.5	14.2	24.5	18.4	15.5	27.1	7.3
Select red oaks	72.1	4.8	7.0	4.8	12.2	12.8	10.1	7.3	10.1	3.0
Other white oaks	103.8	9.4	9.5	17.5	11.1	16.6	12.8	12.3	12.4	2.2
Other red oaks	221.6	9.6	24.8	30.5	29.2	34.4	26.9	18.8	34.9	12.5
Hickory	52.6	6.2	6.5	6.4	6.6	14.5	4.5	6.0	1.9	—
Soft maples	51.9	14.1	11.1	10.7	4.1	1.9	4.1	2.4	2.8	.7
Beech	50.5	3.2	4.7	7.8	5.5	7.9	5.4	4.3	11.3	.4
Sweetgum	81.5	5.7	11.5	22.8	18.4	6.1	7.3	3.9	5.8	—
Blackgum	54.4	5.8	7.3	6.6	11.1	10.1	4.9	4.4	4.2	—
Yellow-poplar	316.8	12.3	17.6	27.9	20.9	39.9	48.4	50.6	85.9	13.3
Black locust	34.1	4.0	8.6	12.7	7.8	—	—	.3	.7	—
Other hardwoods	107.3	17.3	17.3	18.7	18.5	12.3	7.3	5.1	10.8	—
Total hardwoods	1,301.4	100.2	143.4	188.9	159.6	181.0	150.1	130.9	207.9	39.4
All species	1,486.5	119.7	172.0	218.7	196.5	205.6	180.1	140.2	214.3	39.4

(Sampling errors are shown in table 52)

Table 45.—*Volume of growing stock on commercial forest land in southern Maryland, by species and diameter classes, 1964*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Shortleaf-loblolly pines	22.1	0.2	1.5	3.6	4.1	2.0	5.7	2.5	2.5	—
Virginia pine	100.6	10.9	21.6	30.9	21.1	7.6	7.7	—	.8	—
Other softwoods	.4	—	.4	—	—	—	—	—	—	—
Total softwoods	123.1	11.1	23.5	34.5	25.2	9.6	13.4	2.5	3.3	—
Select white oaks	42.9	2.2	3.1	4.8	7.9	6.4	7.8	1.7	9.0	—
Other white oaks	17.4	2.1	2.2	3.4	3.4	2.6	.6	.5	1.3	1.3
Red oaks	45.2	.8	6.2	4.0	9.9	8.0	2.4	7.1	4.6	2.2
Hickory	20.6	3.6	1.2	3.2	1.7	.8	3.3	2.3	4.5	—
Beech	10.7	1.6	2.8	1.5	—	.5	—	—	4.3	—
Sweetgum	62.8	11.1	5.1	13.4	9.1	6.2	10.2	3.2	4.5	—
Blackgum	9.8	2.3	2.2	1.5	.8	.7	.6	.9	—	.8
Yellow-poplar	56.3	1.4	4.0	7.4	4.7	12.4	9.8	2.9	7.7	6.0
Other hardwoods	38.9	4.7	7.5	8.2	7.6	3.1	3.2	2.5	2.1	—
Total hardwoods	304.6	29.8	34.3	47.4	45.1	40.7	37.9	21.1	38.0	10.3
All species	427.7	40.9	57.8	81.9	70.3	50.3	51.3	23.6	41.3	10.3

Table 46.—*Volume of growing stock on commercial forest land in southern Eastern Shore, Maryland, by species and diameter classes, 1964*
(In millions of cubic feet)

Species	Diameter class (inches at breast height)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Shortleaf-loblolly pines	281.6	27.4	63.9	68.5	47.4	31.1	17.2	9.2	16.9	—
Other softwoods	6.2	1.1	.6	1.6	2.9	—	—	—	—	—
Total softwoods	287.8	28.5	64.5	70.1	50.3	31.1	17.2	9.2	16.9	—
Select white oaks	46.3	9.9	11.3	12.0	4.0	4.2	1.0	1.4	2.5	—
Other white oaks	13.1	1.6	2.6	3.8	2.5	.4	—	—	1.3	.9
Red oaks	63.4	9.3	10.3	11.0	9.3	7.6	7.8	3.3	4.8	—
Soft maples	43.0	10.5	14.7	10.2	2.6	2.9	1.2	—	.9	—
Sweetgum	65.0	9.3	10.3	11.4	9.6	9.3	9.0	4.2	1.9	—
Blackgum	34.8	6.3	2.4	6.5	9.3	6.8	1.4	1.5	.6	—
Other hardwoods	27.2	6.3	9.2	3.2	3.1	3.1	—	1.1	1.2	—
Total hardwoods	292.8	53.2	60.8	58.1	40.4	34.3	20.4	11.5	13.2	.9
All species	580.6	81.7	125.3	128.2	90.7	65.4	37.6	20.7	30.1	.9

Table 47.—*Volume of growing stock on commercial forest land in western Maryland, by species and diameter classes, 1964*

(In millions of cubic feet)

Species	Diameter class (inches at breast height)									
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Virginia pine	11.3	0.8	5.7	0.7	3.1	1.0	—	—	—	—
Hemlock	17.9	6.4	7.6	.7	.2	.1	1.1	1.6	.2	—
Other softwoods	6.6	.8	2.0	1.3	1.2	—	—	—	1.3	—
Total softwoods	35.8	8.0	15.3	2.7	4.5	1.1	1.1	1.6	1.5	—
Select white oaks	67.4	9.9	11.4	25.8	4.1	9.7	2.4	1.7	2.4	—
Select red oaks	95.5	11.6	12.4	13.5	15.2	16.9	4.8	12.0	9.0	0.1
Other red oaks	77.4	13.6	19.2	25.0	5.3	6.2	1.9	1.4	3.8	1.0
Other white oaks	47.4	16.8	11.9	8.9	3.5	2.2	2.0	.9	1.2	—
Hickory	23.7	3.3	6.1	4.3	3.9	4.5	.4	1.0	.2	—
Sugar maple	15.5	4.9	3.0	1.5	1.6	.2	.3	—	4.0	—
Soft maples	32.2	14.8	7.4	4.8	2.5	2.3	.1	—	.2	.1
Basswood	8.3	1.3	1.9	1.2	1.1	.8	.3	.3	1.4	—
Black cherry	25.6	3.1	5.0	6.2	3.6	2.1	3.5	1.6	.5	—
Black locust	6.5	.8	2.5	1.8	1.4	—	—	—	—	—
Other hardwoods	31.0	7.2	5.8	5.6	3.1	.7	3.3	1.2	4.0	.1
Total hardwoods	430.5	87.3	86.6	98.6	45.3	45.6	19.0	20.1	26.7	1.3
All species	466.3	95.3	101.9	101.3	49.8	46.7	20.1	21.7	28.2	1.3

Table 48.—*Volume of sawtimber on commercial forest land in north-central Maryland, by species and diameter classes, 1964*
(In millions of board feet)

Species	Diameter class (inches at breast height)							
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Shortleaf-loblolly pines	204.8	26.5	40.5	45.6	55.6	18.5	18.1	—
Virginia pine	244.1	59.8	70.4	35.9	55.0	15.7	7.3	—
Other softwoods	27.0	5.7	8.2	3.1	3.6	3.8	2.6	—
Total softwoods	475.9	92.0	119.1	84.6	114.2	38.0	28.0	—
Select white oaks	449.0	—	51.1	93.8	73.7	62.6	128.7	39.1
Select red oaks	221.5	—	42.0	50.8	45.1	29.4	43.0	11.2
Other white oaks	272.2	—	40.6	63.1	51.6	54.0	54.4	8.5
Other red oaks	624.5	—	104.6	130.3	108.7	82.4	142.9	55.6
Hickory	126.9	—	21.7	53.4	15.6	27.4	8.8	—
Soft maples	63.0	—	13.7	8.1	16.0	11.5	10.5	3.2
Beech	138.6	—	17.9	29.9	19.6	17.5	51.5	2.2
Sweetgum	158.4	—	63.1	22.9	26.3	17.6	28.5	—
Blackgum	123.6	—	36.4	36.8	17.0	17.5	15.9	—
Yellow-poplar	1,053.0	—	77.1	150.2	188.2	212.9	364.0	60.6
Black locust	30.6	—	25.7	—	—	1.1	3.8	—
Other hardwoods	201.4	—	61.3	44.2	27.8	22.5	45.6	—
Total hardwoods	3,462.7	—	555.2	683.5	589.6	556.4	897.6	180.4
All species	3,938.6	92.0	674.3	768.1	703.8	594.4	925.6	180.4

(Sampling errors are shown in table 52)

Table 49.—*Volume of sawtimber on commercial forest land in southern Maryland, by species and diameter classes, 1964*

(In millions of board feet)

Species	Diameter class (inches at breast height)							
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Shortleaf-loblolly pines	72.8	11.4	13.7	6.4	21.6	10.0	9.7	—
Virginia pine	230.5	101.1	69.9	27.1	28.6	—	3.8	—
Total softwoods[1]	303.3	112.5	83.6	33.5	50.2	10.0	13.5	—
Select white oaks	133.3	—	28.9	27.8	31.9	7.1	37.6	—
Other white oaks	39.1	—	12.0	10.0	2.6	2.7	6.0	5.8
Red oaks	147.2	—	38.2	32.6	10.4	32.2	21.4	12.4
Hickory	51.0	—	7.0	3.5	11.5	10.0	19.0	—
Beech	18.5	—	—	2.2	—	—	16.3	—
Sweetgum	136.4	—	34.2	26.0	43.0	13.7	19.5	—
Blackgum	15.3	—	2.5	3.0	2.2	3.5	—	4.1
Yellow-poplar	174.4	—	16.2	47.0	42.0	12.2	32.6	24.4
Other hardwoods	72.6	—	26.9	11.7	12.3	11.2	10.5	—
Total hardwoods	787.8	—	165.9	163.8	155.9	92.6	162.9	46.7
All species	1,091.1	112.5	249.5	197.3	206.1	102.6	176.4	46.7

[1] Volume of other softwoods is negligible.

Table 50.—*Volume of sawtimber on commercial forest land in southern Eastern Shore, Maryland, by species and diameter classes, 1964*

(In millions of board feet)

Species	Diameter class (inches at breast height)							
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Shortleaf-loblolly pines	667.6	222.8	157.0	110.4	65.3	37.9	74.2	—
Other softwoods [1]	14.5	4.8	9.7	—	—	—	—	—
Total softwoods	682.1	227.6	166.7	110.4	65.3	37.9	74.2	—
Select white oaks	50.2	—	14.8	17.4	3.4	5.3	9.3	—
Other white oaks	20.6	—	9.2	1.7	—	—	6.4	3.3
Red oaks	122.1	—	32.2	28.2	28.7	12.5	20.5	—
Soft maples	29.7	—	9.7	11.7	4.9	—	3.4	—
Sweetgum	136.2	—	36.1	35.6	36.5	19.5	8.5	—
Blackgum	72.9	—	33.2	24.7	5.3	6.5	3.2	—
Other hardwoods	33.2	—	11.6	12.7	—	4.2	4.7	—
Total hardwoods	464.9	—	146.8	132.0	78.8	48.0	56.0	3.3
All species	1,147.0	227.6	313.5	242.4	144.1	85.9	130.2	3.3

[1] Includes 12,800,000 board feet of Virginia pine.

Table 51.—*Volume of sawtimber on commercial forest land in western Maryland, by species and diameter classes, 1964*

(In millions of board feet)

Species	Diameter class (inches at breast height)							
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Virginia pine	16.1	2.1	10.8	3.2	—	—	—	—
Hemlock	15.0	2.5	.6	.2	4.0	6.8	.9	—
Other softwoods	14.0	4.7	3.7	—	—	—	5.6	—
Total softwoods	45.1	9.3	15.1	3.4	4.0	6.8	6.5	—
Select white oaks	74.5	—	14.5	35.1	8.7	6.6	9.6	—
Select red oaks	222.6	—	54.2	64.1	19.5	47.5	37.0	.3
Other red oaks	80.6	—	18.2	22.9	7.0	5.6	23.0	3.9
Other white oaks	34.4	—	11.8	7.9	7.1	3.2	4.4	—
Hickory	36.4	—	13.1	17.5	1.2	3.8	.8	—
Sugar maple	24.5	—	6.7	.5	1.1	—	16.2	—
Soft maples	18.2	—	8.4	8.6	.4	—	.6	.2
Basswood	14.0	—	3.7	2.7	.9	1.2	5.5	—
Black cherry	41.6	—	12.4	7.3	12.6	6.7	2.6	—
Black locust	5.0	—	5.0	—	—	—	—	—
Other hardwoods	49.1	—	10.9	2.6	12.2	4.7	18.3	.4
Total hardwoods	600.9	—	158.9	169.2	70.7	79.3	118.0	4.8
All species	646.0	9.3	174.0	172.6	74.7	86.1	124.5	4.8

Table 52.—*Sampling errors, in percent, for growing stock (GS) and sawtimber (ST) on commercial forest land in Maryland, by species and geographic units, 1964*

Species	North-central		Southern		Southern Eastern Shore		Western	
	GS	ST	GS	ST	GS	ST	GS	ST
Shortleaf-loblolly pines	38	40	34	37	14	15		—
Virginia pine	29	38	23	25	—	—	48	*
Hemlock	—	—	—	—	—	—	36	43
Other softwoods	*	*	**	—	*	*	**	*
Select white oaks	15	17	25	30	26	43	26	27
Select red oaks	19	20	—	—	—	—	15	17
Other white oaks	31	40	48	*	43	*	21	27
Other red oaks	13	15	24	22	23	33	30	34
Hickory	20	26	46	*	—	—	30	38
Sugar maple	—	—	—	—	—	—	36	*
Soft maples	16	23	—	—	21	40	19	33
Beech	24	26	35	*	—	—	—	—
Sweetgum	23	26	18	26	20	27	—	—
Blackgum	20	25	30	*	34	32	—	—
Basswood	—	—	—	—	—	—	49	49
Yellow-poplar	17	16	24	27	—	—	—	—
Black cherry	—	—	—	—	—	—	*	*
Black locust	39	*	—	—	—	—	47	*
Other hardwoods	15	21	24	31	26	42	22	21

* Sampling error is between 50 and 99 percent.
** Sampling error is 100 percent and over.

Table 53.—*Net annual growth of growing stock on commercial forest land in Maryland, by species and geographic units, 1963*

(In thousands of cubic feet)

Species	North-central	Southern	Southern Eastern Shore	Western	State totals
Softwoods:					
Yellow pines[1]	5,639	4,224	10,175	352	20,390
Hardwoods:					
Select oak species	8,309	1,598	1,512	4,179	15,598
Other oaks	8,552	1,562	1,935	2,951	15,000
Hickory	1,617	593	—	683	2,893
Sweetgum	2,715	2,091	2,164	—	6,970
Soft maples	2,112	223	1,651	1,128	5,114
Yellow-poplar	11,816	2,066	—	—	13,882
Other hardwoods	8,540	1,431	1,932	1,912	13,815
Total	43,661	9,564	9,194	10,853	73,272
All species	49,300	13,788	19,369	11,205	93,662

[1] Includes 170,000 cubic feet of growth for other softwoods.

Table 54.—*Annual cut of growing stock on commercial forest land in Maryland, by species and geographic units, 1963*

(In thousands of cubic feet)

Species	North-central	Southern	Southern Eastern Shore	Western	State totals
Softwoods:					
Yellow pines [1]	4,144	11,868	11,938	150	28,100
Hardwoods:					
Select oak species	2,340	2,914	1,361	4,280	10,895
Other oaks	2,476	2,199	478	2,051	7,204
Hickory	233	—	55	1,027	1,315
Ash, walnut, cherry	398	—	—	364	762
Sugar maple	—	—	80	653	733
Sweetgum	1,135	447	607	—	2,189
Soft maples	597	92	327	1,980	2,996
Yellow-poplar	11,129	1,155	—	—	12,284
Other hardwoods	4,805	1,025	720	798	7,348
Total	23,113	7,832	3,628	11,153	45,726
All species	27,257	19,700	15,566	11,303	73,826
	Sampling errors, in percent				
All softwoods	*	33	23	*	19
All hardwoods	29	30	38	35	18
All species	27	20	22	35	13

[1] Includes 150,000 cubic feet of cut for other softwoods.

*Sampling error is between 50 and 90 percent.

Table 55.—*Net annual growth of sawtimber on commercial forest land in Maryland, by species and geographic units, 1963*

(In thousands of board feet)

Species	North-central	Southern	Southern Eastern Shore	Western	State totals
Softwoods:					
Yellow pines [1]	16,034	7,113	35,048	930	59,125
Hardwoods:					
Select oak species	26,319	5,369	2,264	12,537	46,489
Other oaks	34,027	4,460	5,154	4,255	47,896
Hickory	3,780	1,089	—	986	5,855
Sweetgum	6,249	4,809	4,977	—	16,035
Soft maples	2,726	524	1,200	764	5,214
Yellow-poplar	48,495	8,022	—	—	56,517
Other hardwoods	19,861	3,291	4,444	4,398	31,994
Total	141,457	27,564	18,039	22,940	210,000
All species	157,491	34,677	53,087	23,870	269,125

[1] Includes 513,000 board feet of growth for other softwoods.

Table 56.—*Annual cut of sawtimber on commercial forest land in Maryland, by species and geographic units, 1963*

(In thousands of board feet)

Species	North-central	Southern	Southern Eastern Shore	Western	State totals
Softwoods:					
Yellow pines [1]	16,072	34,186	46,600	—	96,858
Hardwoods:					
Select oak species	8,893	12,194	5,181	13,411	39,679
Other oaks	7,543	7,096	2,026	4,772	21,437
Hickory	864	—	—	3,665	4,529
Ash, walnut, cherry	1,020	—	—	1,085	2,105
Sugar maple	—	—	—	1,555	1,555
Sweetgum	—	954	1,573	—	2,527
Soft maples	—	434	1,037	2,786	4,257
Yellow-poplar	37,234	5,903	—	—	43,137
Other hardwoods	8,780	4,170	3,970	660	17,580
Total	64,334	30,751	13,787	27,934	136,806
All species	80,406	64,937	60,387	27,934	233,664
	Sampling errors, in percent				
All softwoods	*	39	23	—	20
All hardwoods	33	32	49	41	20
All species	30	22	24	41	15

[1] Volume of cut for other softwoods is negligible.

*Sampling error is between 50 and 99 percent.

Table 57.—*Land area of Maryland, by land classes and counties, 1964*

(In thousands of acres)

County	Total land area [1]	Nonforest land area	Forest land area		
			Noncommercial [2]	Commercial	Sampling error [3]
Allegany	272.6	70.8	1.5	200.3	6
Anne Arundel	266.9	140.9	.2	125.8	13
Baltimore*	439.6	277.4	3.1	159.1	14
Calvert	140.2	48.6	0	91.6	18
Caroline	204.8	123.1	.1	81.6	16
Carroll	289.9	212.5	0	77.4	22
Cecil	225.3	127.9	.8	96.6	20
Charles	293.1	105.9	1.8	185.4	10
Dorchester	371.2	212.4	3.6	155.2	8
Frederick	425.0	266.9	12.4	145.7	15
Garrett	423.7	131.5	2.3	289.9	7
Harford	286.7	125.0	29.8	131.9	15
Howard	160.0	103.3	.8	55.9	28
Kent	181.8	127.1	1.3	53.4	32
Montgomery	315.5	213.2	1.6	100.7	17
Prince Georges	310.4	146.1	6.2	158.1	12
Queen Annes	238.7	163.3	0	75.4	21
St. Marys	234.9	77.7	0	157.2	11
Somerset	212.5	123.2	3.8	85.5	8
Talbot	178.6	129.9	0	48.7	30
Washington	295.7	181.4	5.0	109.3	18
Wicomico	243.2	129.8	0	113.4	10
Worcester	309.1	117.6	4.1	187.4	8
Total	6,319.4	3,355.5	78.4	2,885.5	2

[1] Land area from 1959 Census of Agriculture.

[2] Includes nonproductive and productive-reserved forest land.

[3] In percent, for commercial forest land, at the 68 percent probability level.

*Includes Baltimore City.

Table 58.—*Area of commercial forest land in Maryland, by ownership classes and counties, 1964*

(In thousands of acres)

County	Publicly-owned[1]		Privately-owned		Total
	State	Other public	Farmer-owned [2]	Other private	
Allegany	36.3	0.7	45.4	117.9	200.3
Anne Arundel	1.3	8.0	19.2	97.3	125.8
Baltimore	.7	13.0	25.3	120.1	159.1
Calvert	0	0	30.3	61.3	91.6
Caroline	.5	0	37.1	44.0	81.6
Carroll	.2	2.6	25.0	49.6	77.4
Cecil	2.7	.2	22.9	70.8	96.6
Charles	3.9	.4	59.5	121.6	185.4
Dorchester	1.5	0	40.4	113.3	155.2
Frederick	.2	7.8	32.8	104.9	145.7
Garrett	74.4	1.6	74.6	139.3	289.9
Harford	0	0	27.0	104.9	131.9
Howard	.6	1.8	14.8	38.7	55.9
Kent	.5	0	19.5	33.4	53.4
Montgomery	.4	2.2	24.5	73.6	100.7
Prince Georges	3.0	3.3	36.8	115.0	158.1
Queen Annes	**	0	30.0	45.4	75.4
St. Marys	0	2.2	47.6	107.4	157.2
Somerset	.6	0	24.1	60.8	85.5
Talbot	.1	0	23.8	24.8	48.7
Washington	3.4	1.2	25.7	79.0	109.3
Wicomico	1.6	0	33.3	78.5	113.4
Worcester	12.4	0	47.1	127.9	187.4
Total	144.3	45.0	766.7	1,929.5	2,885.5

[1] Acreages are from ownership records; not from sample plots.

[2] State total obtained from sample plots. The distribution by counties is based upon a reduction factor that was applied to the acreages of farm woodland by counties in the 1959 Census of Agriculture.

** Less than 50 acres.

Table 59.—*Area of commercial forest land in Maryland, by stand-size classes and counties, 1964*
(In thousands of acres)

County	Sawtimber stands	Poletimber stands	Sapling-and-seedling stands	Nonstocked areas	Total
Allegany	81.2	84.7	30.0	4.4	200.3
Anne Arundel	79.3	30.0	15.4	1.1	125.8
Baltimore	106.6	35.9	15.5	1.1	159.1
Calvert	56.6	19.8	13.2	2.0	91.6
Caroline	58.4	16.5	6.0	.7	81.6
Carroll	49.7	19.0	8.2	.5	77.4
Cecil	66.1	19.9	10.2	.4	96.6
Charles	125.5	31.3	25.7	2.9	185.4
Dorchester	93.1	50.0	9.1	3.0	155.2
Frederick	104.9	28.9	10.8	1.1	145.7
Garrett	121.7	115.6	46.1	6.5	289.9
Harford	97.2	25.1	8.5	1.1	131.9
Howard	38.8	12.1	4.5	.5	55.9
Kent	33.3	13.0	6.7	.4	53.4
Montgomery	73.3	19.8	7.1	.5	100.7
Prince Georges	113.0	31.1	12.1	1.9	158.1
Queen Annes	51.0	16.6	7.0	.8	75.4
St. Marys	99.1	30.5	25.3	2.3	157.2
Somerset	53.7	24.7	5.0	2.1	85.5
Talbot	34.3	10.9	2.6	.9	48.7
Washington	76.2	22.2	10.1	.8	109.3
Wicomico	65.9	37.8	7.6	2.1	113.4
Worcester	114.5	58.5	11.0	3.4	187.4
Total	1,793.4	753.9	297.7	40.5	2,885.5

Table 60.—*Area of commercial forest land in Maryland, by stocking-percent classes of desirable trees and counties, 1964*
(In thousands of acres)

County	Desirable tree stocking class			Total
	70 to 100 percent	40 to 70 percent	Under 40 percent	
Allegany	—	—	200.3	200.3
Anne Arundel	1.4	11.3	113.1	125.8
Baltimore	1.4	16.9	140.8	159.1
Calvert	5.5	37.9	48.2	91.6
Caroline	.5	8.2	72.9	81.6
Carroll	.7	9.6	67.1	77.4
Cecil	.8	8.8	87.0	96.6
Charles	9.2	74.2	102.0	185.4
Dorchester	9.2	59.6	86.4	155.2
Frederick	.8	15.1	129.8	145.7
Garrett	—	—	289.9	289.9
Harford	.7	11.4	119.8	131.9
Howard	.4	6.1	49.4	55.9
Kent	.6	5.6	47.2	53.4
Montgomery	.5	10.3	89.9	100.7
Prince Georges	.9	12.6	144.6	158.1
Queen Annes	.6	8.5	66.3	75.4
St. Marys	9.5	66.0	81.7	157.2
Somerset	5.3	28.0	52.2	85.5
Talbot	.2	5.6	42.9	48.7
Washington	.8	9.6	98.9	109.3
Wicomico	6.6	45.0	61.8	113.4
Worcester	9.2	65.6	112.6	187.4
Total	64.8	515.9	2,304.8	2,885.5

Table 61.—*Area of commercial forest land in Maryland, by forest types and counties, 1964*

(In thousands of acres)

County	Forest type						Total
	Yellow pines	Oak-pine	Oak-hickory	Oak-gum	Elm-ash-red maple	Miscellaneous types [1]	
Allegany	—	19.9	145.4	6.7	—	28.3	200.3
Anne Arundel	41.2	12.8	45.7	15.3	8.2	2.6	125.8
Baltimore	11.0	21.2	88.3	29.4	4.6	4.6	159.1
Calvert	33.4	12.2	28.5	15.2	2.3	—	91.6
Caroline	13.5	8.8	39.8	13.6	4.7	1.2	81.6
Carroll	2.0	5.9	54.1	9.8	4.4	1.2	77.4
Cecil	4.8	10.2	66.4	10.8	3.2	1.2	96.6
Charles	67.6	23.5	66.6	24.1	3.6	—	185.4
Dorchester	78.2	19.8	22.2	25.6	9.4	—	155.2
Frederick	—	2.8	133.2	—	8.5	1.2	145.7
Garrett	—	14.5	223.3	3.9	4.9	43.3	289.9
Harford	4.0	6.0	93.9	20.7	3.6	3.7	131.9
Howard	—	4.8	40.1	7.0	3.1	.9	55.9
Kent	8.4	7.4	24.5	9.5	3.6	—	53.4
Montgomery	4.8	8.4	69.2	11.8	5.5	1.0	100.7
Prince Georges	47.6	14.0	64.6	19.5	9.6	2.8	158.1
Queen Annes	4.6	9.9	33.0	16.7	11.2	—	75.4
St. Marys	55.9	23.8	50.5	23.5	3.5	—	157.2
Somerset	43.1	8.5	9.8	15.2	7.0	1.9	85.5
Talbot	28.1	4.8	6.3	7.0	2.5	—	48.7
Washington	11.1	14.0	65.2	2.0	12.1	4.9	109.3
Wicomico	57.6	10.6	14.2	18.9	10.9	1.2	113.4
Worcester	81.2	35.2	31.5	33.4	3.9	2.2	187.4
Total	598.1	299.0	1,416.3	339.6	130.3	102.2	2,885.5

[1] Acreage in this type is mostly the white pine (39,000 acres) and maple-beech type (41,600 acres). It also includes small acreages of the spruce type and the aspen forest type.

Table 62.—*Net cubic-foot volume of all trees on commercial forest land in Maryland, by counties, tree classes, and softwoods and hardwoods, 1964*

(In millions of cubic feet)

County	Sawtimber trees		Poletimber trees		Cull trees		Total net volume
	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods	
Allegany	6.1	66.8	10.2	115.1	0.7	11.3	210.2
Anne Arundel	10.7	67.2	4.6	35.2	.7	6.8	125.2
Baltimore	15.5	94.3	5.7	46.6	.8	9.0	171.9
Calvert	16.9	40.0	6.8	24.6	.4	6.5	95.2
Caroline	8.9	52.8	2.7	25.8	.4	4.7	95.3
Carroll	7.0	42.1	3.1	20.7	.5	4.3	77.7
Cecil	7.4	58.7	3.1	29.6	.5	5.4	104.7
Charles	42.2	86.8	15.8	48.7	.7	13.4	207.6
Dorchester	55.0	31.9	26.2	46.5	.3	10.2	170.1
Frederick	14.9	94.5	4.8	46.0	.8	8.5	169.5
Garrett	6.4	91.2	13.1	157.4	.6	18.4	287.1
Harford	14.3	90.6	4.0	44.3	.6	7.8	161.6
Howard	6.1	34.6	2.0	16.9	.3	3.2	63.1
Kent	3.5	26.7	2.0	14.0	.3	2.8	49.3
Montgomery	9.7	67.4	3.2	32.7	.5	5.9	119.4
Prince Georges	16.6	101.0	4.9	51.0	.8	9.0	183.3
Queen Annes	7.3	43.0	2.7	21.3	.5	4.2	79.0
St. Marys	29.4	66.3	12.0	38.2	.5	10.9	157.3
Somerset	31.3	18.8	17.6	25.9	.1	6.0	99.7
Talbot	6.4	29.1	1.8	14.3	.3	2.8	54.7
Washington	8.7	66.9	3.5	34.1	.6	6.1	119.9
Wicomico	39.7	22.2	18.2	33.5	.2	7.3	121.1
Worcester	68.8	47.8	31.0	66.2	.3	12.9	227.0
Total	432.8	1,340.7	199.0	988.6	11.4	177.4	3,149.9

Table 63.—*Volume of growing stock and sawtimber on commercial forest land in Maryland, by counties and stand-size classes, 1964*

County	Growing Stock					Sawtimber				
	Saw-timber stands	Pole-timber stands	Other stands	All stands	Sam-pling error	Saw-timber stands	Pole-timber stands	Other stands	All stands	Sam-pling error
	Million cubic feet				*Percent*	*Million board feet*				*Percent*
Allegany	102.9	91.8	3.5	198.2	10	212.1	67.7	5.0	284.8	16
Anne Arundel	100.1	16.3	1.3	117.7	22	285.4	16.7	3.0	305.1	29
Baltimore	139.9	21.0	1.2	162.1	19	405.3	21.3	3.0	429.6	23
Calvert	68.9	18.0	1.4	88.3	19	196.2	22.0	2.7	220.9	25
Caroline	79.1	10.5	.6	90.2	26	229.2	10.8	1.3	241.3	33
Carroll	62.2	10.1	.6	72.9	26	180.4	10.5	1.6	192.5	32
Cecil	86.5	11.4	.9	98.8	23	246.5	10.7	2.2	259.4	29
Charles	162.5	28.2	2.8	193.5	11	459.0	34.9	5.7	499.6	14
Dorchester	117.9	38.8	2.9	159.6	13	268.9	38.3	8.4	315.6	20
Frederick	141.1	18.1	1.0	160.2	21	408.0	18.4	2.4	428.8	26
Garrett	148.2	114.8	5.1	268.1	8	280.4	73.5	7.3	361.2	12
Harford	135.4	17.0	.8	153.2	22	390.4	17.1	2.0	409.5	24
Howard	51.8	7.4	.4	59.6	31	150.8	7.7	.9	159.4	40
Kent	39.4	6.2	.6	46.2	26	111.0	6.4	1.4	118.8	29
Montgomery	99.9	12.4	.7	113.0	24	287.8	12.3	1.7	301.8	29
Prince Georges	152.4	19.9	1.2	173.5	21	436.3	20.7	2.7	459.7	27
Queen Annes	64.5	9.2	.6	74.3	30	185.9	9.8	1.5	197.2	34
St. Marys	116.4	26.6	2.9	145.9	14	332.3	33.5	4.8	370.6	18
Somerset	72.6	19.4	1.6	93.6	17	157.3	18.6	5.0	180.9	25
Talbot	44.7	6.6	.3	51.6	32	130.0	7.8	.6	138.4	38
Washington	99.5	12.7	1.0	113.2	27	282.3	12.5	2.3	297.1	33
Wicomico	81.7	29.5	2.4	113.6	16	188.1	29.2	6.6	223.9	26
Worcester	162.4	47.9	3.5	213.8	11	373.6	42.9	10.1	426.6	18
Total	2,330.0	593.8	37.3	2,961.1	3	6,197.2	543.3	82.2	6,822.7	4

Table 64.—*Volume of growing stock on commercial forest land in Maryland, by counties and species, 1964*

(In millions of cubic feet)

County	SOFTWOODS				HARDWOODS				
	Shortleaf-loblolly pines	Virginia pine	Other [1] softwoods	Total softwoods	Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory
Allegany	—	5.2	11.1	16.3	27.8	41.1	17.9	36.3	11.4
Anne Arundel	1.3	20.4	2.0	23.7	6.8	5.7	7.9	8.8	3.8
Baltimore	2.1	6.8	1.6	10.5	20.6	7.8	12.7	26.2	5.2
Calvert	4.6	19.0	.1	23.7	8.3	1.7	3.7	7.2	4.6
Caroline	16.1	22.2	—	38.3	4.9	2.1	3.4	12.6	1.5
Carroll	—	.7	—	.7	8.0	3.5	5.3	25.2	2.2
Cecil	.4	6.7	—	7.1	9.8	5.2	7.2	17.9	3.9
Charles	9.9	47.9	.2	58.0	20.0	3.1	8.0	19.0	7.9
Dorchester	79.0	1.8	.4	81.2	12.6	.3	4.0	16.5	1.1
Frederick	1.0	4.4	2.7	8.1	19.4	9.0	13.5	28.6	6.6
Garrett	—	6.1	13.4	19.5	39.6	54.4	29.5	41.1	12.3
Harford	—	.6	—	.6	18.8	8.3	12.3	28.8	6.4
Howard	—	—	—	—	11.6	2.8	4.5	12.1	1.9
Kent	7.0	1.7	1.1	9.8	4.2	2.4	2.6	2.4	1.7
Montgomery	—	5.0	.2	5.2	11.9	5.5	9.0	17.7	4.3
Prince Georges	2.8	27.7	1.4	31.9	17.6	8.2	11.0	12.5	6.4
Queen Annes	11.2	2.5	—	13.7	7.8	3.7	5.4	6.8	2.5
St. Marys	7.6	33.7	.1	41.4	14.6	2.4	5.7	11.8	8.1
Somerset	48.2	.6	.1	48.9	6.4	.2	1.7	10.0	.4
Talbot	20.9	4.0	—	24.9	2.6	2.2	1.0	4.1	1.6
Washington	1.1	7.9	1.6	10.6	10.8	5.7	8.0	17.9	4.6
Wicomico	56.3	1.3	.3	57.9	8.9	.2	3.2	11.3	.9
Worcester	98.1	1.4	.3	99.8	18.4	.8	4.2	24.1	.9
Total	367.6	227.6	36.6	631.8	311.4	176.3	181.7	398.9	100.2

CONTINUED

Table 64 — Continued

County	HARDWOODS								Total all species
	Soft maples	Beech	Sweet-gum	Black-gum	Yellow-poplar	Black locust	Other hardwoods	Total hardwoods	
Allegany	13.3	2.0	—	1.4	—	3.0	27.7	181.9	198.2
Anne Arundel	4.3	3.7	11.7	4.4	24.9	3.0	9.0	94.0	117.7
Baltimore	5.3	5.5	14.7	6.1	32.8	3.6	11.1	151.6	162.1
Calvert	1.2	2.4	13.5	2.0	12.3	.2	7.5	64.6	88.3
Caroline	1.4	2.5	6.2	1.7	9.1	.9	5.6	51.9	90.2
Carroll	2.5	1.1	—	2.6	15.1	1.5	5.2	72.2	72.9
Cecil	3.8	2.7	4.6	3.5	23.7	2.1	7.3	91.7	98.8
Charles	2.5	4.4	27.0	4.3	24.6	.6	14.1	135.5	193.5
Dorchester	11.6	1.0	16.8	9.0	1.0	—	4.5	78.4	159.6
Frederick	6.2	5.8	—	6.6	39.3	3.8	13.3	152.1	160.2
Garrett	18.9	2.5	—	2.0	.9	3.5	43.9	248.6	268.1
Harford	5.7	7.8	10.6	6.8	31.0	4.4	11.7	152.6	153.2
Howard	1.9	2.1	3.4	2.2	11.6	1.3	4.2	59.6	59.6
Kent	2.0	.9	2.2	1.5	11.5	1.1	3.9	36.4	46.2
Montgomery	3.8	4.4	7.2	4.2	29.1	3.2	7.5	107.8	113.0
Prince Georges	6.1	7.0	13.4	6.5	36.0	4.5	12.4	141.6	173.5
Queen Annes	2.8	1.3	3.5	2.5	16.8	1.3	6.2	60.6	74.3
St. Marys	2.1	3.9	22.3	3.5	19.4	.4	10.3	104.5	145.9
Somerset	6.6	.8	10.9	4.8	.8	—	2.1	44.7	93.6
Talbot	1.7	2.0	4.0	1.8	4.3	—	1.4	26.7	51.6
Washington	4.4	3.7	—	4.0	31.6	3.4	8.5	102.6	113.2
Wicomico	8.2	.7	11.3	6.8	.6	—	3.6	55.7	113.6
Worcester	16.6	1.2	26.0	14.2	1.7	—	5.9	114.0	213.8
Total	132.9	69.4	209.3	102.4	378.1	41.8	226.9	2,329.3	2,961.1

[1] Includes mostly hemlock in Allegany and Garrett counties.

Table 65.—*Volume of sawtimber on commercial forest land in Maryland, by counties and species, 1964*

(In millions of board feet)

County	SOFTWOODS				HARDWOODS				
	Shortleaf-loblolly pines	Virginia pine	Other softwoods [1]	Total softwoods	Select white oaks	Select red oaks	Other white oaks	Other red oaks	Hickory
Allegany	—	8.4	14.1	22.5	32.2	105.0	8.5	37.0	15.3
Anne Arundel	4.7	49.3	5.0	59.0	22.9	17.2	19.4	26.0	9.0
Baltimore	7.8	14.7	4.1	26.6	57.4	23.3	32.6	75.8	12.9
Calvert	14.6	43.1	—	57.7	24.4	6.3	8.2	23.9	11.3
Caroline	64.5	39.1	—	103.6	14.1	6.5	9.3	36.1	3.8
Carroll	—	1.8	—	1.8	22.8	10.6	14.0	65.8	5.3
Cecil	1.4	16.5	—	17.9	27.8	16.4	18.2	48.1	9.1
Charles	33.5	111.6	—	145.1	65.8	11.7	18.3	58.5	19.2
Dorchester	187.9	4.5	.6	193.0	13.4	.7	6.8	30.9	3.3
Frederick	2.6	11.4	4.3	18.3	56.3	27.7	36.7	78.3	16.0
Garrett	—	7.7	14.9	22.6	42.3	117.6	25.9	43.6	21.1
Harford	—	1.6	—	1.6	54.5	25.1	33.8	81.1	16.1
Howard	—	—	—	—	30.5	8.4	12.3	35.1	4.8
Kent	19.3	2.2	2.7	24.2	12.4	7.7	5.9	6.6	3.7
Montgomery	—	12.9	.5	13.4	34.4	17.2	24.2	48.4	10.6
Prince Georges	10.7	68.4	6.4	85.5	51.8	25.0	29.1	38.4	15.5
Queen Annes	31.9	3.2	—	35.1	22.4	11.6	14.1	20.1	5.7
St. Marys	24.7	75.8	—	100.5	43.1	9.0	12.6	37.8	20.5
Somerset	107.3	1.6	.2	109.1	7.0	.4	3.1	20.4	1.2
Talbot	59.1	5.2	—	64.3	10.2	6.5	2.8	17.6	3.7
Washington	2.8	17.8	4.0	24.6	31.5	18.3	19.8	47.1	10.7
Wicomico	135.0	3.3	.4	138.7	9.2	.5	5.0	20.5	2.5
Worcester	237.4	3.4	.5	241.3	20.6	1.8	5.7	46.9	2.5
Total	945.2	503.5	57.7	1,506.4	707.0	474.5	366.3	944.0	223.8

CONTINUED

TABLE 65 — CONTINUED

County	HARDWOODS								Total all species
	Soft maples	Beech	Sweet-gum	Black-gum	Yellow-poplar	Black locust	Other hardwoods	Total Hardwoods	
Allegany	5.5	2.8	—	3.5	—	3.0	49.5	262.3	284.8
Anne Arundel	5.7	9.6	23.5	9.5	82.6	2.6	18.1	246.1	305.1
Baltimore	7.0	15.2	28.9	13.9	109.9	3.3	22.8	403.0	429.6
Calvert	2.8	4.2	29.3	3.1	36.8	.4	12.5	163.2	220.9
Caroline	1.9	6.7	12.4	3.8	30.5	.8	11.8	137.7	241.3
Carroll	3.2	3.2	—	5.9	52.5	1.3	6.1	190.7	192.5
Cecil	4.4	7.3	8.2	7.9	78.8	1.9	13.4	241.5	259.4
Charles	4.6	7.1	57.2	6.8	77.7	1.4	26.2	354.5	499.6
Dorchester	7.6	—	34.7	19.1	1.7	—	4.4	122.6	315.6
Frederick	7.5	16.1	—	15.4	130.5	3.4	22.6	410.5	428.8
Garrett	12.7	2.1	—	5.0	2.6	2.0	63.7	338.6	361.2
Harford	6.6	21.8	20.7	15.7	102.4	4.2	25.9	407.9	409.5
Howard	2.5	5.9	6.5	5.2	38.9	1.2	8.1	159.4	159.4
Kent	2.3	2.1	4.1	3.1	38.6	.9	7.2	94.6	118.8
Montgomery	4.2	12.6	13.8	9.6	96.8	3.0	13.6	288.4	301.8
Prince Georges	7.2	19.2	27.7	14.8	118.2	4.0	23.3	374.2	459.7
Queen Annes	3.6	3.3	7.0	5.7	56.0	1.0	11.6	162.1	197.2
St. Marys	4.7	7.2	49.9	5.4	59.9	.7	19.3	270.1	370.6
Somerset	5.4	—	20.2	10.8	1.3	—	2.0	71.8	180.9
Talbot	2.1	5.4	5.6	4.3	12.7	—	3.2	74.1	138.4
Washington	4.8	10.2	—	8.8	104.6	3.0	13.7	272.5	297.1
Wicomico	5.1	—	23.4	14.3	1.1	—	3.6	85.2	223.9
Worcester	11.6	—	57.9	28.7	3.3	—	6.3	185.3	426.6
Total	123.0	162.0	431.0	220.3	1,237.4	38.1	388.9	5,316.3	6,822.7

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[1] Includes mostly hemlock in Allegany and Garrett counties.

PHOTO CREDITS: Except as otherwise noted, the photographs used in this report were provided by the Maryland Department of Forests and Parks.

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DEPARTMENT OF AGRICULTURE

The TIMBER RESOURCES of PENNSYLVANIA

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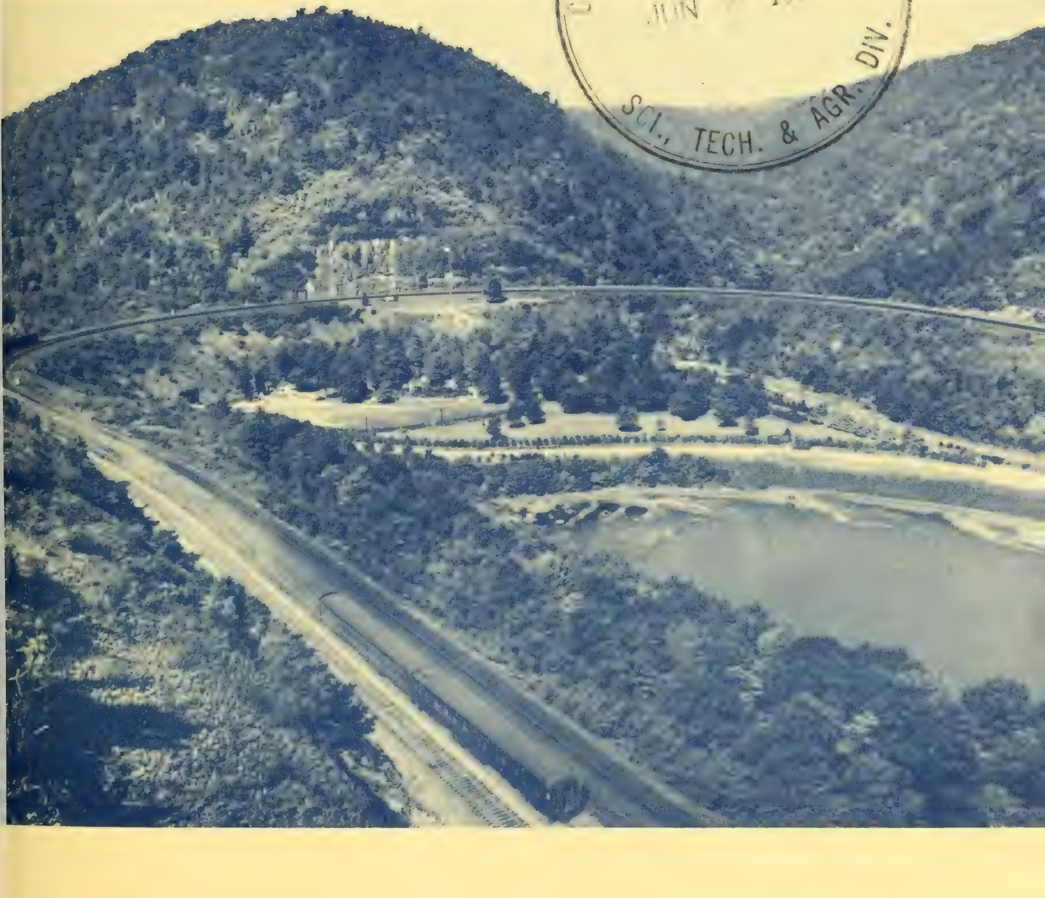

U. S. FOREST SERVICE RESOURCE BULLETIN NE-8
1968

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U.S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

PREFACE

UNDER the authority of the McSweeney-McNary Forest Research Act of May 22, 1928, and subsequent amendments, the Forest Service, U. S. Department of Agriculture, conducts a series of continuing forest surveys of all states to provide up-to-date information about the forest resources of the Nation.

A resurvey of the timber resources in Pennsylvania was made in 1963-65 by the Northeastern Forest Experiment Station, approximately 10 years after the initial forest survey.

In this resurvey, as in the initial survey, the Northeastern Station again received cooperation from the Pennsylvania Department of Forests and Waters. The Department purchased the aerial photographs of the entire State that were used for the resurvey, and gathered information on the output of timber products. State field crews remeasured initial forest-survey plots and established new plots on all State forest land.

Personnel of the Allegheny National Forest carried out the part of the survey on National Forest land in northwestern Pennsylvania. The Area Redevelopment Administration financed the establishment of many additional field sample plots to provide data of greater reliability. The Glatfelter Paper Company provided additional funds to intensify the survey in nine counties in the south-central part of the State.

This report summarizes the timber-resource situation and the changes that have taken place since the initial survey, and points out trends of the timber supply.

In this resurvey, a large percent of the initial ground plots were remeasured to provide estimates of net annual timber growth and estimates of land-use change and to update the initial forest inventory volume. New ground plots were established for an independent second estimate. These two sets of estimates were weighted and combined to give the current estimates of forest area and timber volume.

Sampling errors, which indicate reliability, are shown for most of the totals of the breakdowns of the new estimates. Users of these resource data are cautioned to read with care the definitions of terms and the section pertaining to the reliability of the estimates.

PHOTO CREDIT: THE PENNSYLVANIA RAILROAD COMPANY.

COVER PHOTO: The famous horseshoe curve, near Altoona in Blair County.

The
TIMBER RESOURCES
# of PENNSYLVANIA

by Roland H. Ferguson

■

The Author

ROLAND H. FERGUSON is a forest economist in the Northeastern Forest Experiment Station's Division of Forest Economics, Recreation, and Wildlife Habitat Research. He received his Bachelor of Science degree in forestry at Oregon State College in 1931, and joined the U. S. Forest Service in 1934. After serving in the southern pine and Douglas-fir regions, he came to the Northeast in 1945, since which time he has been engaged in various aspects of the forest survey.

FS-453897

The scenic Susquehanna River in Bradford County.

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Highlights

TEN years have passed since the Northeastern Forest Experiment Station completed its first forest survey of the timber resources of Pennsylvania. During this period considerable changes took place—forest-land area increased and total timber volume increased. Annual growth is so much greater than the annual cut that new industries will find an ample timber supply. The resurvey of Pennsylvania, completed in 1965, showed that—

- Commercial forest land amounts to 16,718,000 acres, an increase of more than 10 percent.

- Growing-stock volume (trees 5.0 inches d.b.h. and larger) adds up to 17,860 million cubic feet, an increase of 30 percent.

- Sawtimber volume of all species amounts to 26,269 million board feet, an increase of 27 percent.

More than one-half (55 percent) of the sawtimber volume is in trees less than 15.0 inches d.b.h.

Forty percent of the volume of sawtimber is in the oak species.

The volume of oak sawtimber increased 40 percent, to 11,086 million board feet.

Black cherry volume makes up more than 10 percent of the total volume of hardwoods.

The volume of black cherry increased 40 percent, to 2,511 million board feet.

Only three species—yellow birch, beech, and basswood—decreased in sawtimber volume. Together their volumes decreased more than 30 percent, down to 1,505 million board feet.

Average net annual growth of growing stock is 615 million cubic feet, and the average annual cut is 204 million cubic feet.

Average net annual growth of sawtimber is 1,001 million board feet, and the average annual cut is 439 million board feet.

Timber Resource Trends

FOREST AREA INCREASED

Commercial forest-land area[1] in Pennsylvania increased considerably in the last 10 years and now totals almost 17 million acres. During the period between surveys, the area of commercial forest land increased at an average rate of 160,000 acres, or about 1 percent per year. Noncommercial forest land also increased to slightly more than 1 percent of the total land area.

Although some forest land was cleared for urban development, superhighways, industrial sites, and other uses, the acreage of nonforest land reverting to forest was much greater. More than 1.5 million acres of cropland and treeless pasture land were abandoned in the 10-year period 1954-64 (U.S. Census of Agriculture). Much of this land became 10 percent or more stocked with growing-stock trees and accounts for most of the large increase in forest-land acreage.

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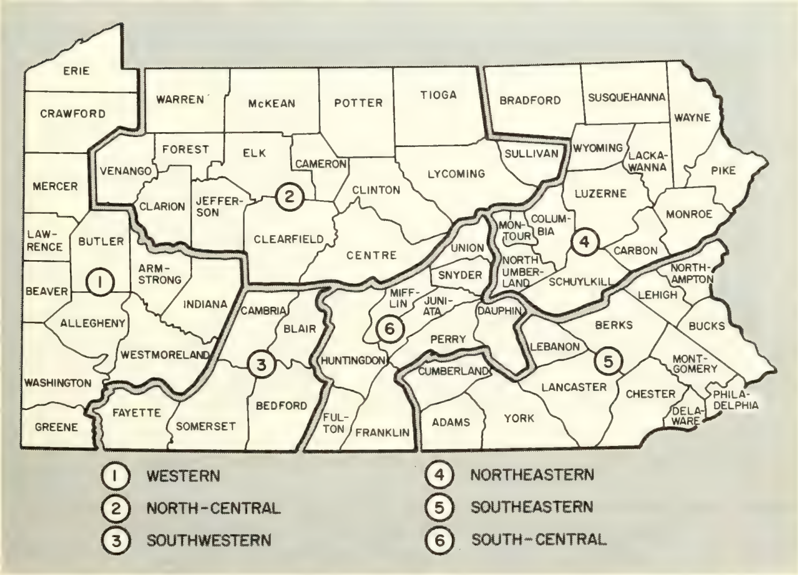
[1] See appendix for definitions of this and other terms used in this report.

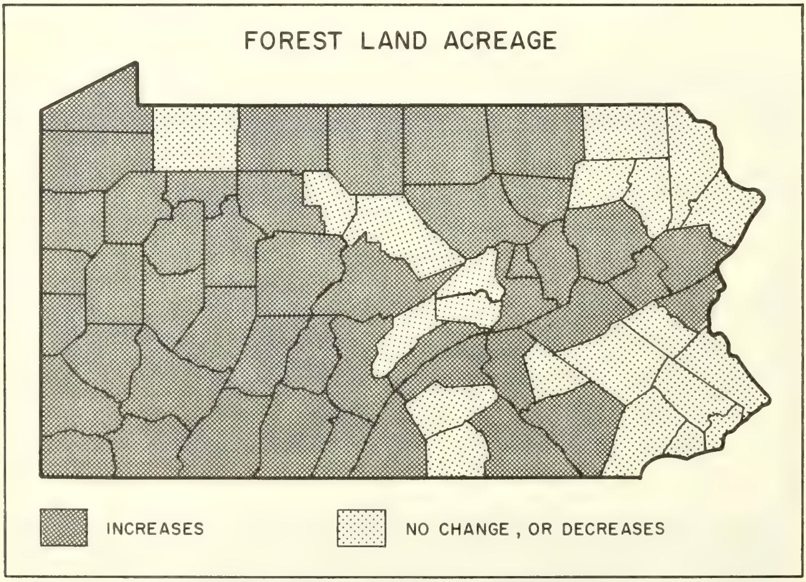
Forest-survey geographic units in Pennsylvania.



The greatest change in commercial forest area occurred in the Western unit, which had an increase of about 40 percent. In contrast, the already lightly forested Southeastern unit decreased 4 percent in commercial forest area. The acreage of commercial forest land and the percent of change for each of the six geographic units are:

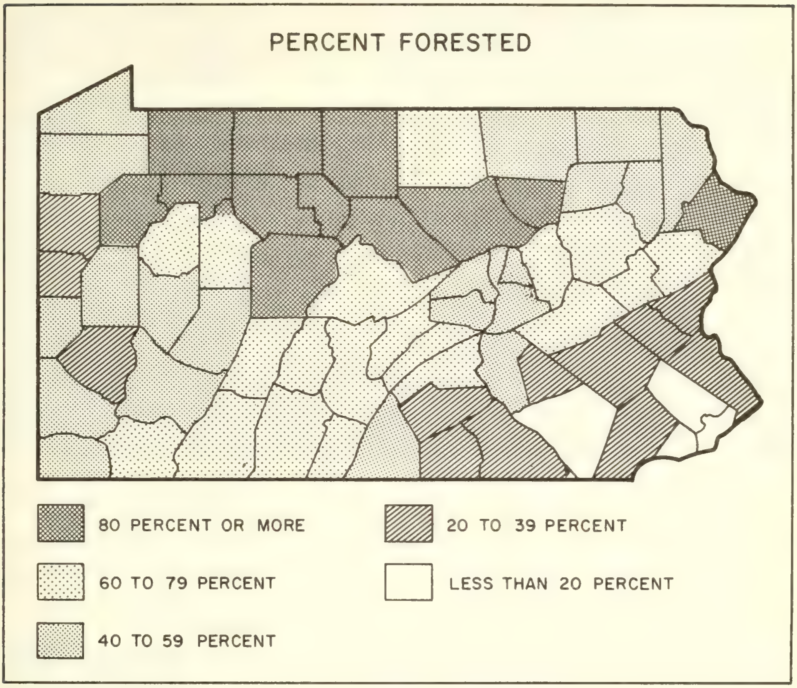
Geographic unit	*1955 (thousand acres)*	*1965 (thousand acres)*	*Change (percent)*
Western	1,791	2,528	41
North-Central	6,016	6,609	10
Southwestern	1,479	1,685	14
Northeastern	2,970	3,109	5
Southeastern	1,125	1,085	—4
South-Central	1,691	1,702	1
State total	15,072	16,718	11

Increase in commercial forest-land acreage varied considerably among counties. Of the 46 counties that had increases, 19 counties had increases of less than 11 percent; 20 counties had



Two-thirds of the 67 counties in Pennsylvania had increases in commercial forest land acreage.

One-half of all the counties of Pennsylvania are more than 60 percent forested.

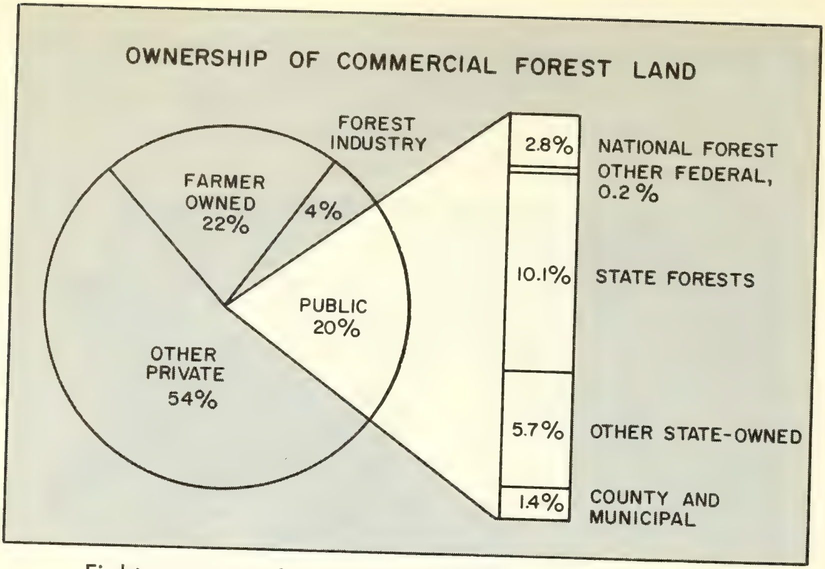


increases of 11 to 40 percent; and seven counties had increases of more than 40 percent. Decreases in commercial forest-land acreage for the remaining 21 counties were as much as 24 percent. The most heavily forested counties are in the northern part of Pennsylvania. Twelve counties now have 80 percent or more of their land in forest—five counties more than in 1955.

Forestry-Industry Holdings Increase

Although forest-industry holdings make up only 4 percent of the commercial forest-land area (610,000 acres), they increased at a faster rate than any other kind of ownership. Forest-industry holdings increased almost 40 percent in forest area during the 10-year period.

Public ownership of commercial forest land makes up 20 percent of the total—3.4 million acres. Half of this is in State



Eighty percent of the commercial forest-land area is in private ownerships; 10 percent is in State Forests, and 10 percent is in other public ownerships.

Forests that are found in 38 of the 67 counties in the State. The Allegheny National Forest, in the northwestern part of the State, accounts for 466,000 acres; and other Federal ownerships total 30,000 acres. The largest increase in public ownership was in county and municipal holdings, which add up to 242,000 acres.

Farmer-owned forest land totals 3.6 million acres. The change in acreage between surveys is due mostly to differences in definitions of farmer-owned woodland and farm woodland. Farm woodland as defined and reported in the U. S. Census of Agriculture was used for the previous estimate.

More than one-half of the total commercial forest land (9.1 million acres) is owned by a large number of small landowners of diverse occupations and by some larger landowners such as coal, oil, and gas companies, and hunting and fishing clubs.

An Increase in Poorly Stocked Stands

Abandoned fields revert slowly to woodland over a period of many years and consequently many are inadequately stocked.

Poorly stocked stands (less than 40 percent stocked with growing-stock trees), although they total less than 2 million acres, make up a greater percentage of total commercial forest land than they did in 1955. These stands now account for more than 10 percent of the total forest-land area. Nonstocked areas (less than 10 percent stocked with growing-stock trees), included in the poorly stocked timber-stand estimates, make up a very small part of the total. The acreage of nonstocked areas amounts to a little more than 300,000 acres.

Timber stands that are more than 40 percent stocked with growing-stock trees also increased in acreage between the two surveys. They now total 14.8 million acres and represent almost 90 percent of the forest-land area. Included in this estimate are 8.7 million acres of timber stands that are well-stocked—stands that are 70 percent or more stocked with growing-stock trees.

Considerable Change in Species Composition

Forest types are classified on the basis of plurality of stocking by key species of all live trees. A change in species composition within a forest stand that affects plurality of stocking of its key species will also affect the forest-type classification. Stocking of softwood trees in many predominantly hardwood stands increased between the two surveys. Softwood forest types increased 30 percent in area to a total of 1.2 million acres.

Oaks and their associated species make up three major forest types, depending upon the stocking of oak and the relative stocking of pine, gum, hickory, and other species. If forest types had been classified on the same basis on the initial survey, the reported acreage for the oak types would have been considerably less, and the acreage of oak types would have shown an increase. (This premise is supported by the fact that growing-stock volume of all oaks increased by more than one-third between surveys.) The current acreage of all oak types is 8.0 million acres—7.7 million acres in oak-hickory and 300,000 acres in oak-pine and oak-gum.

The sugar maple-beech-yellow birch type made up about one-fourth of the commercial forest-land area in 1955 and about one-fifth in 1965. Some of the decrease is attributable to procedure, and some is due to a decrease in beech and yellow birch. This forest type covers 3.5 million acres and includes the localized black cherry forest type.

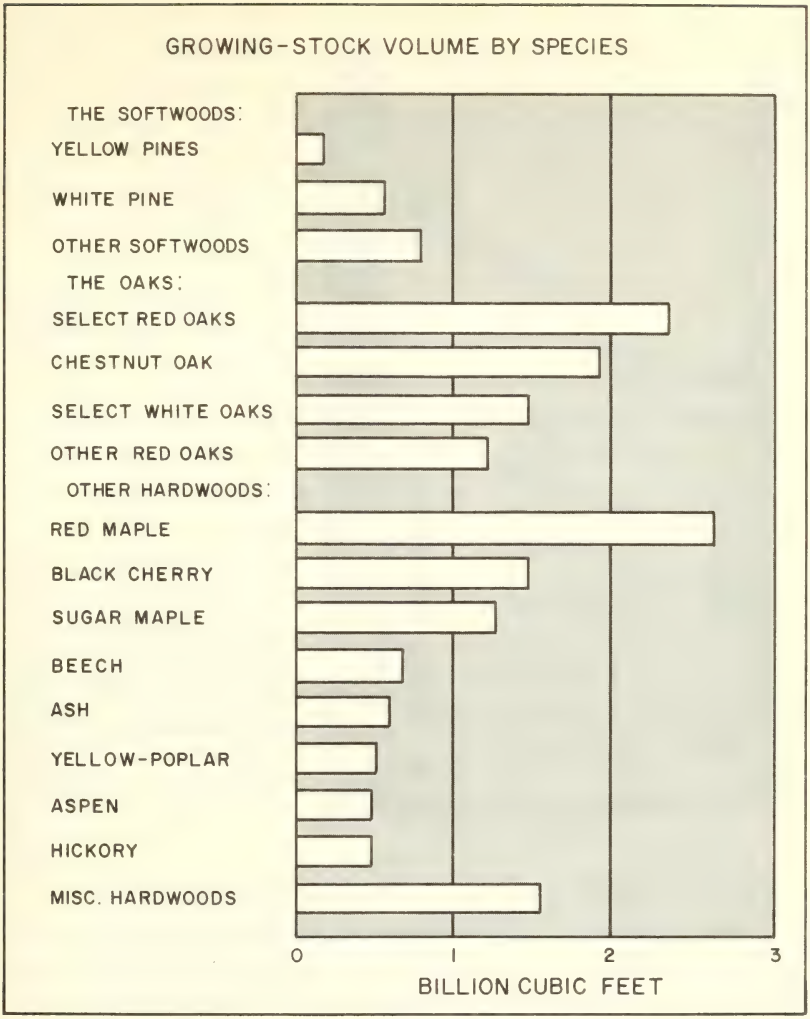
All other hardwood forest types are included in two major forest types—elm-ash-red maple and aspen-birch. As mentioned earlier, a considerable acreage of these types was included in the 1955 oak type estimates; therefore the actual increase in acreage of the elm-ash-red maple and aspen-birch types is less than indicated. Acreage in these two major forest types now amounts to 4.0 million acres.

GROWING-STOCK VOLUME INCREASED

Soundwood volume in all live trees now totals 20 million cubic feet, an increase of nearly one-half since the initial survey. Of the trees that were 5.0 inches d.b.h. and larger, an average of one tree out of seven was a rough or rotten tree. Volume in such trees, about one-tenth of the soundwood volume, increased by 50 percent. Growing-stock volume increased by 30 percent to 17.9 million cubic feet.

The largest concentration of growing-stock volume was found in the North-Central unit—7.9 billion cubic feet, or 44 percent of the State total. However, this unit had the smallest percent of increase between surveys, a little over 20 percent. The volume of growing-stock and the percent change for each of the geographic units are:

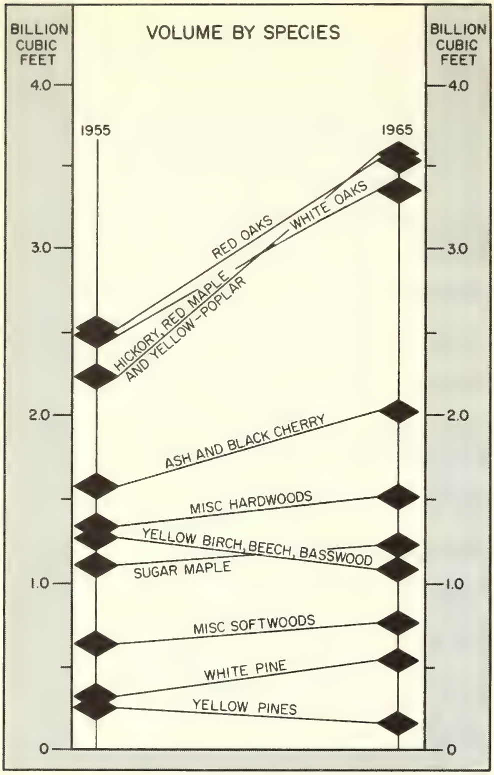
Geographic unit	*1955 (million cubic feet)*	*1965 (million cubic feet)*	*Change (percent)*
Western	1,497	2,139	43
North-Central	6,480	7,928	22
Southwestern	1,173	1,698	45
Northeastern	2,055	2,814	37
Southeastern	969	1,264	30
South-Central	1,576	2,017	28
State total	13,750	17,860	30



Seven species or species groups had growing-stock volumes that exceeded 1 billion cubic feet.

Hardwoods Increased More than Softwoods

Hardwood growing-stock volume increased at a faster rate than softwood growing-stock volume. Hardwood volume increased 31 percent, and softwood volume increased 16 percent. The proportion of softwood volume to total growing-stock volume dropped slightly, from 9 to 8 percent.



Oaks had the largest increases in volume. Yellow birch, beech, and basswood all decreased in volume; and the yellow pines also decreased in volume.

Most of the softwood volume—1,052 out of the 1,477 million cubic feet total—is found in the North-Central and Northeastern units. The volume is about equally divided between the pines and all other softwoods.

Oaks as a group make up almost 40 percent of the growing-stock volume, or 6,877 million cubic feet. Red maple accounts for more volume than any other single species in the State—2,611 million cubic feet. Black cherry and sugar maple are the only other species whose volume in 1965 exceeded 1 billion cubic feet.

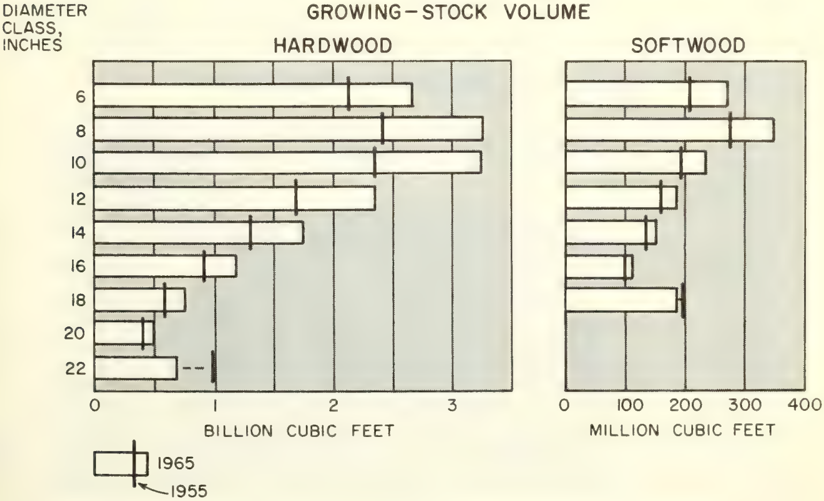
Although softwoods and hardwoods increased considerably in volume, individual species had a wide variation of increases and decreases. Yellow pines decreased 35 percent—from 258 million to 168 million cubic feet—but white pine and hemlock increased by more than 30 percent.

Yellow birch, beech, and basswood had an average decrease in volume of more than 10 percent, but all other hardwoods had increases in volume. Hickory, red maple, and yellow-poplar volumes increased by about 60 percent. The other hardwood species had increases in volume that ranged from about 5 to 40 percent.

Greatest Increase in Poletimber Volume

Volume in poletimber trees (9,788 million cubic feet) makes up more than one-half of the total growing-stock volume. Softwood volume in the 6- and 8-inch diameter class totals more than 40 percent of the softwood volume, and hardwood volume in the 6-, 8-, and 10-inch diameter class totals more than 55 percent of the hardwood volume.

Between surveys, the volume in softwood poletimber trees increased to 623 million cubic feet; the larger increase in volume was in the 8-inch diameter class. Volume in hardwood poletimber trees increased to 9,165 million cubic feet. The greatest



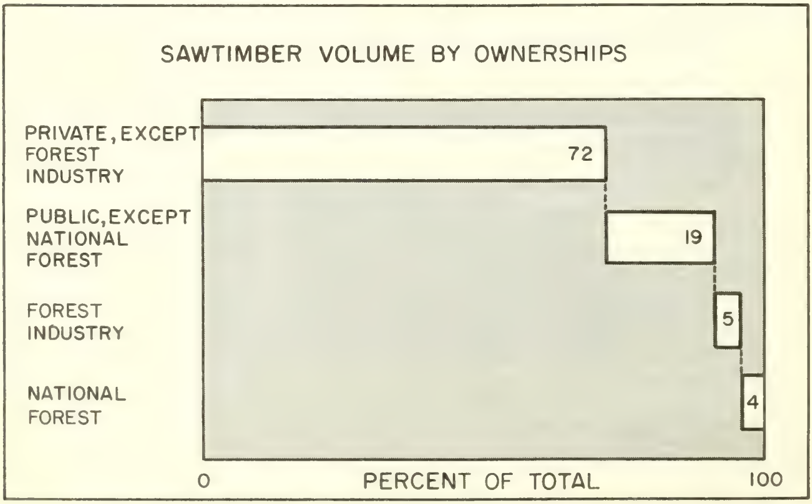
Softwood poletimber trees (6- and 8-inch diameter classes) increased about 30 percent in volume, and hardwood poletimber trees (6-, 8-, and 10-inch diameter classes) increased 33 percent in volume.

increases were in the 8- and 10-inch diameter classes; together they increased to 37 percent more than their combined volume in 1955.

SAWTIMBER VOLUME INCREASED

Sawtimber volume increased between surveys to 26 billion board feet, of which 3.3 billion is softwood and 23.0 billion is hardwood. White pine, Virginia pine, and pitch pine volumes (about 1.7 million board feet) make up one-half of the softwood volume. Northern red oak, with 4.4 billion board feet, is the predominant hardwood species and makes up almost one-fifth of the hardwood volume. The next most prominent species are black cherry and red maple, each with 2.5 billion board feet. These are followed by white oak, chestnut oak, other red oaks, sugar maple, and yellow-poplar. All other hardwood species had less than 1 billion board feet each.

Private owners collectively own 77 percent (20.3 billion board feet) of the sawtimber volume. Of this, forest industry owns



Private owners own more than three-fourths of the sawtimber volume. Volume in public ownerships makes up almost one-fourth of the State total.

1.1 billion board feet, 5 percent of the State total. The Allegheny National Forest has 1.1 billion board feet. State Forests and other public ownerships have 4.9 billion board feet. Sawtimber volume in public ownerships more than doubled between surveys, and the volume in private ownerships dropped about 3 percent.

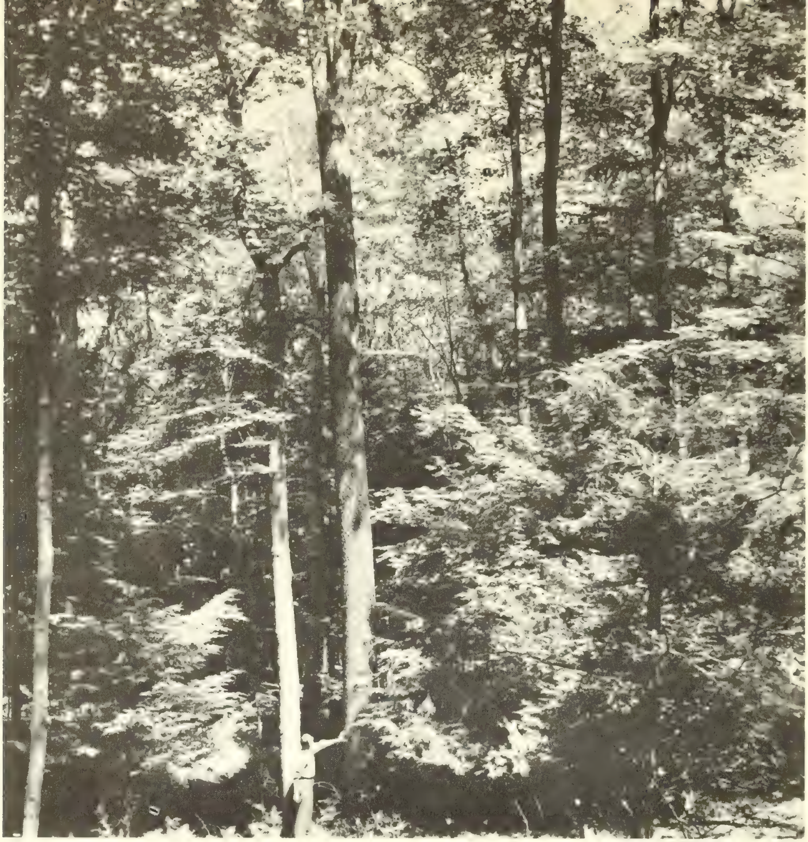
The large changes in sawtimber volume by ownerships caused corresponding changes in average volume per acre of commercial forest land. Average volume per acre for all ownerships is 1,570 board feet. National Forest land has an average of 2,340 board feet per acre, and all other public forest land has 1,680 board feet per acre. Because of the large increase in forest land, the average volume per acre of privately owned forest land dropped from 1,780 to 1,520 board feet, a decrease of about 15 percent.

Volume in North-Central Unit Increased 2 Billion Board Feet

The North-Central unit, largest in forest acreage, also had the largest volume of sawtimber (11 billion board feet), more than 40 percent of the State total. Sawtimber volume in this unit increased 25 percent between surveys. Increases in sawtimber volume by units ranged from 14 percent to 39 percent as shown in the following tabulation:

Geographic unit	*1955 (million board feet)*	*1965 (million board feet)*	*Change (percent)*
Western	2,784	3,378	21
North-Central	8,982	11,203	25
Southwestern	1,941	2,627	35
Northeastern	2,577	3,590	39
Southeastern	1,871	2,126	14
South-Central	2,490	3,345	34
State total	20,645	26,269	27

The proportion of softwood volume varied among the geographic units. In the Western, Southwestern, and Southeastern units, softwoods made up about 5 percent of the board-foot volume. In the North-Central and South-Central units, softwoods made up about 12 percent; and in the Northeastern unit, softwoods made up almost 30 percent of the volume.



FS-488953

A mature black cherry tree in north-central Pennsylvania, in the heart of this species' small commercial range.

The largest volume of many species is found in the North-Central unit. This unit contains almost 70 percent (1,725 million board feet) of the black cherry sawtimber volume, 55 percent of the red maple volume (1,400 million board feet), 50 percent of the sugar maple volume (671 million board feet), and 45 percent of the northern red oak volume (2,032 million board feet). All other hardwood species in this unit account for one-third of their total volume.

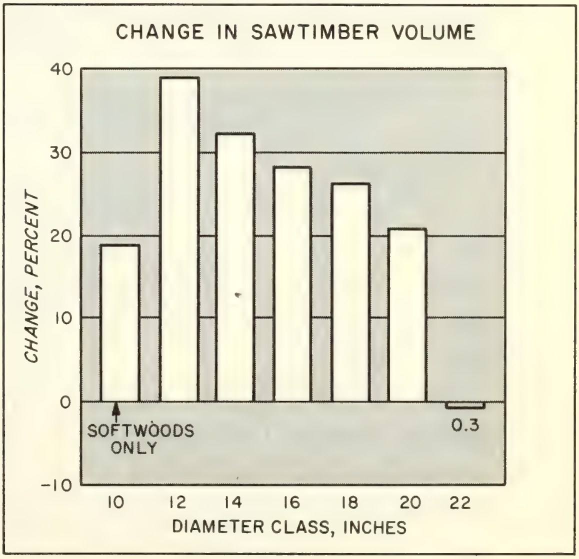
The Southeastern unit, with about 8 percent of the commercial forest land in the State, had the largest volume of yellow-poplar sawtimber—443 million board feet. This represents more than one-third of the total volume of yellow-poplar in the State.

Volume Increased Most in Small Sawtimber

Although the volume of all sawtimber trees increased 27 percent, most of the increase was in the smaller-size sawtimber trees (less than 15.0 inches d.b.h.). The volume in these smaller trees increased by 35 percent. Volume in the larger sawtimber trees—most in demand for products such as lumber and veneer—increased almost 20 percent. In this larger sawtimber class, softwood volume decreased about 2 percent to 1.3 billion board feet, and hardwood volume increased about 22 percent to 10.4 billion board feet.

Best Quality Sawtimber Has Decreased

Standard-lumber log grades are based upon several factors, one of which is minimum log diameter. (See appendix for complete specifications.) Because of this, sawtimber trees in the smaller d.b.h. classes usually fail to have a grade-1 sawlog. The increase in volume of trees over 15.0 inches d.b.h. was small, and this resulted in a lower proportion of grade-1 sawlogs. These



Largest increase in board-foot volume was in the 12-inch diameter class.

FS-488936

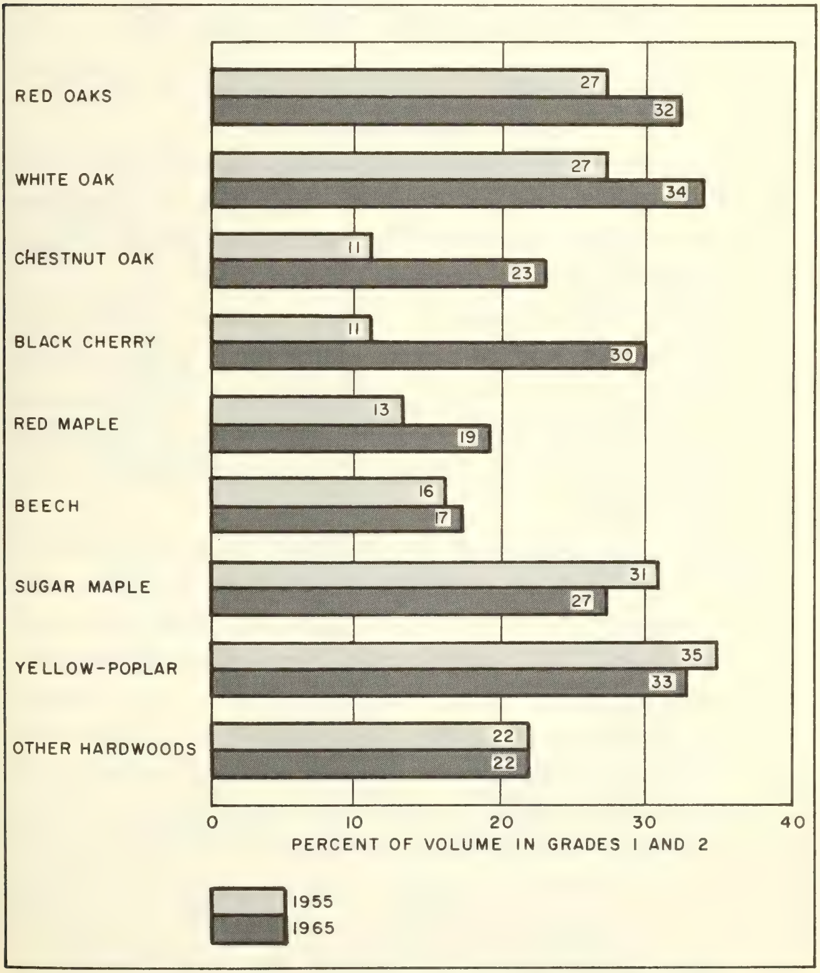
High-quality sawtimber such as this sugar maple tree is becoming scarce.

are the sawlogs most in demand for veneer and high-quality lumber. Grade-1 hardwood sawlogs now make up only 9 percent of the hardwood sawtimber volume in contrast to 12 percent in 1955.

The volume in grade-2 hardwood sawlogs more than doubled between surveys. The proportion of the total volume in grade-2 sawlogs increased from 10 to 19 percent. The combined volume in these better sawlogs (grades 1 and 2) increased about 2.5 billion board feet between surveys. Black cherry sawtimber volume had the largest percent of increase in the combined grades 1 and 2. Hardwood board-foot volume of log grades 1 and 2 reached 28 percent, up from 22 percent in 1955.

Hardwood volume that could not meet specification for grades 1 and 2 standard-lumber logs increased about 3 billion board feet to 16.7 billion board feet. However, the proportion of total hardwood volume in grade-3 standard-lumber logs and tie-and-timber logs decreased from 78 to 72 percent.

QUALITY OF HARDWOOD SAWTIMBER



Sawtimber quality (standard-lumber log grade 2 and better) of most hardwoods increased between surveys.

White pine, the principal softwood species that was graded into more than one standard-lumber log grade, makes up only about 6 percent of the total sawtimber volume. Specifications for white pine log grades were changed between surveys; and one additional grade was included in 1965. Direct comparisons of volume in grades 1 and 2 for the two surveys cannot be made; however, it appears that the quality of white pine is not as good as it was on the previous survey.

GROWTH IS THREE TIMES THE CUT

Annual Increase of 400 Million Cubic Feet

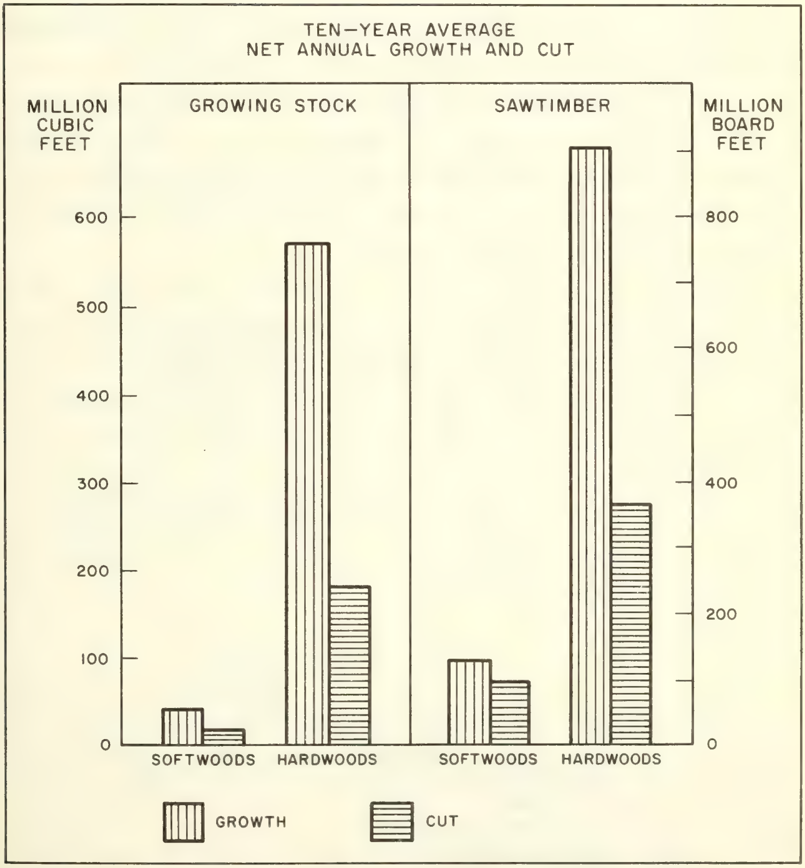
Average annual net growth of growing stock for the 10-year period between surveys is 615 million cubic feet, and the annual cut is 204 million cubic feet. The net annual growth averages 39 cubic feet per acre of commercial forest land.

Softwood volumes make up almost 7 percent of the total volume of growth and 10 percent of the total volume that was cut. Softwood growing stock is being cut more heavily in relation to net annual growth than the hardwoods—50 percent of the softwood growth as compared to about 30 percent of the hardwood growth.

Mortality rates are not severe in Pennsylvania, and since the average annual cut is considerably less than the net annual growth, mortality has had little effect on the relative abundance of most species. The average annual mortality for all species is 66 million cubic feet (less than ½ percent of the inventory volume). Hardwood mortality rate in relation to inventory volume is about 60 percent greater than the softwood mortality rate.

Ingrowth of growing-stock trees that became 5.0 inches d.b.h. and larger since the trees were first measured on the initial survey makes up about 35 percent of the average annual gross growth. The proportion of ingrowth is larger than it was in 1954, when it made up 30 percent of the gross growth. The volume for components of net annual growth is:

Components	*Volume (million cubic feet)*
Growth on growing stock	473
Ingrowth into poletimber	+208
Gross annual growth	681
Annual mortality	—66
Net annual growth	615



The volume of annual growth greatly exceeds the volume of cut for both softwoods and hardwoods.

Annual Net Increase of 560 Million Board Feet

Sawtimber, during the period between measurements, grew at an average net annual rate of 1,001 million board feet, and for the same period an average of 439 million board feet were cut each year. Based on the assumption that annual growth in sawtimber stands is proportional to the inventory volume, 84 percent of the board-foot growth occurs in sawtimber stands. This is equivalent to 115 board-foot growth per acre for sawtimber stands.

Sawtimber volume is being cut more heavily, in relation to annual growth, than growing-stock volume for both softwoods and hardwoods. The cut of softwood sawtimber volume is about 75 percent of the net annual growth, and the cut of hardwood sawtimber volume is 40 percent of the growth.

The average annual mortality of sawtimber trees amounts to 52 million board feet. This is 5 percent of the volume of gross growth. Hardwoods and softwoods had the same rate of mortality in relation to gross growth, but hardwoods had a higher rate in relation to inventory volume.

Ingrowth—the volume of trees that reached sawtimber size—made up almost 70 percent of the gross annual growth in board feet. Softwood sawtimber ingrowth made up slightly more than 40 percent of the gross growth, which is about the same as it was on the initial survey. Hardwood sawtimber ingrowth made up slightly more than 70 percent of the gross growth in the period between surveys, but in 1948 it made up only 50 percent.

The above components of net annual growth of sawtimber are briefly summarized below:

Components	*Growth (million board feet)*
Growth on sawtimber trees	364
Ingrowth into sawtimber	+689
Gross annual growth	1,053
Annual mortality	—52
Net annual growth	1,001

Net Annual Growth Is Increasing

The average net annual growth estimates in this report were computed from remeasured plot data, but the net annual growth estimates for 1954 reported in the first timber resource report[2] were derived from increment-core measurements. Growth estimates for 1954 were recomputed on the basis of the average annual growth estimates from the remeasured plots. The volume of net annual growth of all growing stock increased from 557 million cubic feet in 1954 to 650 million cubic feet in 1964.

The volume of annual growth increased for the hardwoods and decreased for the softwoods. Hardwood growing stock in 1964 was growing at a rate of 610 million cubic feet per year as compared to 512 million cubic feet per year in 1954. Annual growth of softwood growing stock decreased during the same period from 45 million to 40 million cubic feet.

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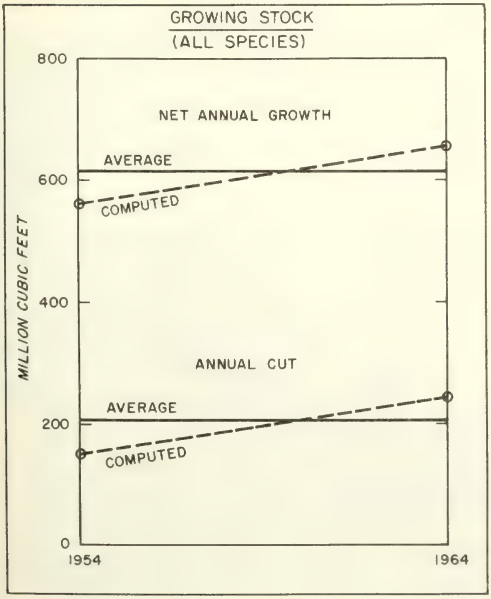
[2] Ferguson, R. H. THE TIMBER RESOURCES OF PENNSYLVANIA. NE. Forest Exp. Sta. 46 pp., illus. Upper Darby, Pa. 1958.



Average net annual growth for the 10-year period is three times the annual cut, and the 1964 net annual growth is almost 100 million cubic feet more than in 1954.

The net annual growth rate of sawtimber increased from 910 million to 1,100 million board feet at the end of the 10-year period. Annual growth, in millions of board feet, increased from 800 to 1,010 for the hardwood species and decreased from 110 to 90 for the softwood species.

Timber Products From The Resource

Total output of timber products in 1964 from growing stock and other sources added up to 173 million cubic feet, a drop of 22 million cubic feet from the 1954 output from all sources. However, the cut from growing stock increased from 154 million cubic feet to 160 million cubic feet in 1964. The output from plant byproducts also increased—13 million cubic feet as compared to 11 million cubic feet in 1954. One reason for the large difference in total volume of output was the decrease in the utilization of cull trees, hardwood limbs, dead trees, and trees from noncommercial and nonforest land. Fuelwood from such sources decreased from 37 million cubic feet in 1954 to less than 1 million cubic feet in 1964.

Sawlog production, in terms of cubic feet of roundwood, made up 55 percent of the total output, as compared to 49 percent of the total in 1954. Pulpwood production, the next largest volume for any product, made up almost 30 percent; and all other products accounted for about 15 percent of the total output from roundwood.

LUMBER PRODUCTION INCREASED

Annual lumber production in Pennsylvania decreased rapidly for about 30 years after its peak year of 1899, when more than 2 billion board feet were cut.[3] A low point in lumber production (200 million board feet) was reached in 1932; then annual lum-

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[3] Steer, Henry B. LUMBER PRODUCTION IN THE UNITED STATES, 1799-1946. U. S. Dep. Agr. Misc. Pub. 669. 233 pp. 1948.

FS-489005

A truckload of sawlogs (about 2,400 board feet) from the Allegheny National Forest.

Lumber stacked for air drying, at Marienville, Forest County.

FS-488983

ber production began to increase once more. Lumber production reported for 1954 was about 495 million board feet. Ten years later lumber production reached 545 million board feet (based upon a 100-percent canvass by the Pennsylvania Department of Forests and Waters), an increase of about 50 million board feet.

Hardwood species made up most of the volume that was converted into lumber. They accounted for 93 percent of the board-foot volume in 1964; just 10 years previously they had accounted for 83 percent.

During this 10-year period, the number of sawmills producing 1 million or more board feet of lumber per year increased from slightly less than 100 to more than 150. The total number of active sawmills in the State decreased from more than 2,000 to about 1,000. The decrease was mainly in the number of small portable sawmills that moved from one forest tract to another.

PULPWOOD PRODUCTION INCREASED

Pulpwood production from roundwood totaled 575,000 cords in 1964, an increase of 80 percent over that reported for 1954. Hardwood species made up almost 85 percent of the volume. Production of pulpwood by major species groups is shown in the tabulation below:[4]

Species group	*Production (thousand cords)*
Hemlock and tamarack	8.5
Pine	81.0
Aspen and yellow-poplar	7.4
Oak and hickory	231.4
Other hardwoods	247.2
All species	575.5

In addition to the output from roundwood, the equivalent of 31,000 cords of pulpwood was produced from plant byproducts in the form of chips and was used within the State. Most of the chipped pulpwood was from the hardwood species. All together 606,500 cords of pulpwood from roundwood and plant bypro-

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[4] Kingsley, Neal P. PULPWOOD PRODUCTION IN THE NORTHEAST, 1964. U. S. Forest Serv. Resource Bull. NE-5. 27 pp., illus. NE. Forest Exp. Sta. 1967.

Photo credit: The Glatfelter Pulp Wood Co.

Mechanical loading of pulpwood.

Photo credit: The Glatfelter Pulp Wood Co.

Unloading pulpwood truck.

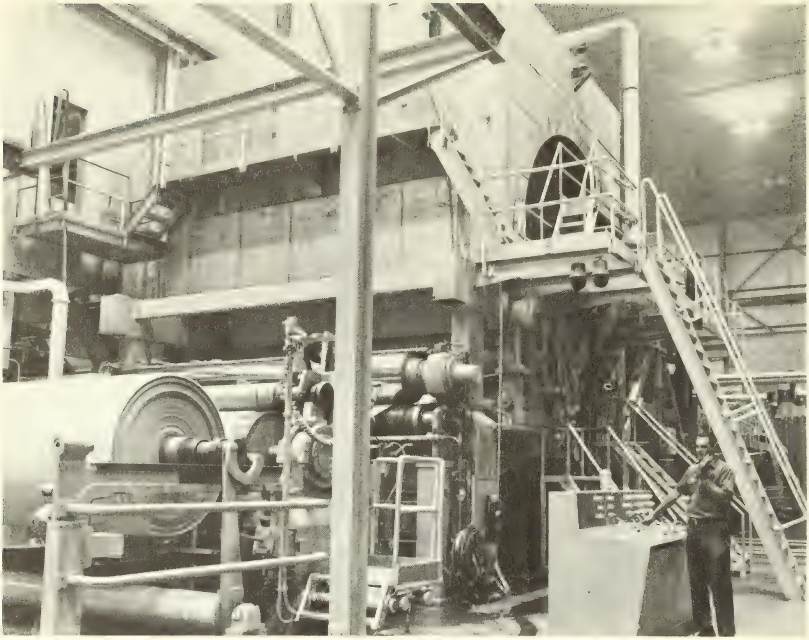


PHOTO CREDIT: CHARMIN PAPER PRODUCTS CO.

Paper tissue machine at the most recently constructed pulpmill in Pennsylvania.

ducts in the form of chips were produced in Pennsylvania, A total of 53,500 cords of pulpwood was shipped out of the State.

Eleven pulpmills are located in Pennsylvania; the largest concentration is in the central part of the State. Another pulpmill, under construction in Wyoming County, will be ready for production in 1967. This will boost pulpwood production higher than the amount shown for 1964.

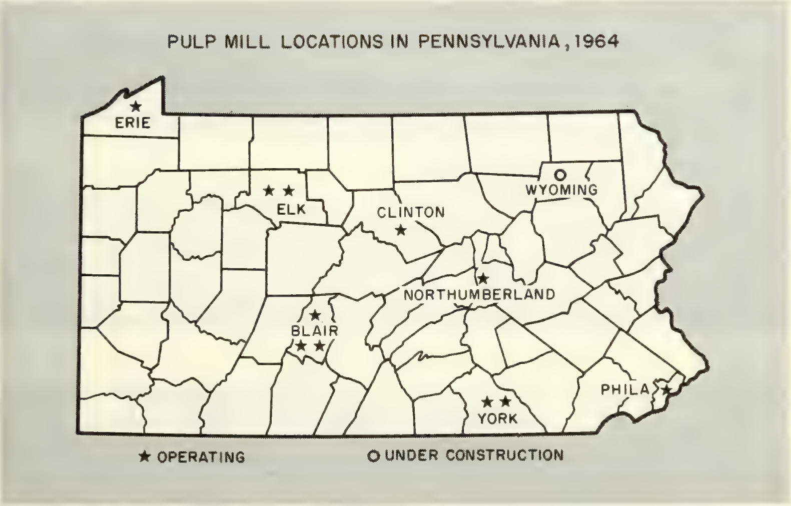
OTHER PRODUCTS DECREASED

All other products, excluding sawlogs and pulpwood, required 36.5 million cubic feet of wood, of which about 30 percent (10.7 million cubic feet) came from plant byproducts. One-half of this volume (18.2 million cubic feet) was used for fuelwood. Volumes for all products other than fuelwood in 1964 are shown below:

Product	*Volume (million cubic feet)*
Mine timbers	3.8
Veneer logs and bolts	2.9
Cooperage logs and bolts	.8
Posts	.2
Miscellaneous industrial wood	10.6
Total	18.3

Miscellaneous industrial wood includes chemical wood, handle stock, particle board, turnery bolts, and the like. Practically all the volume used was from hardwood species.

The total volume of output for all other products, including fuelwood, decreased 47 percent since 1954. Fuelwood production from both roundwood and plant byproducts accounted for most of that decrease; it dropped by 38 million cubic feet. All other products—excluding sawlogs, pulpwood, and fuelwood—decreased slightly during the 10-year period, from 21.1 million cubic feet to 18.3 million cubic feet.

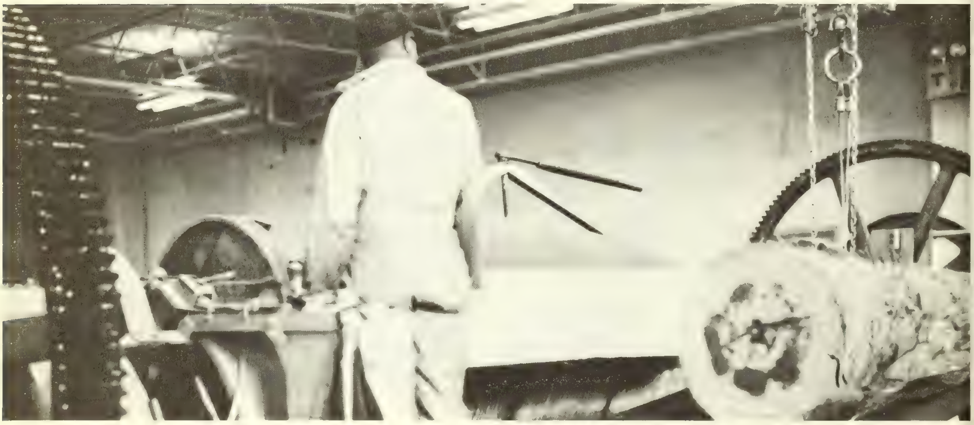


Seven companies have 11 pulpmills that use pulpwood or wood chips. Another company is constructing a pulpmill in Wyoming County.

Photo credit: Department of Forests and Waters.

Pennsylvania veneer production,
New Freedom, York County.

Veneer log on lathe



Veneer sheets coming from lathe.

Veneer ready for shipping.

Opportunities For Management

In Pennsylvania there are one National Forest, State Forests, and thousands of privately owned timber stands. The Allegheny National Forest and all the State Forests together total 2.2 million acres; other publicly owned forest land amounts to 1.2 million acres; and all other forest land totals 13.3 million acres. It is on these 13 million acres of privately owned forest land (80 percent of the commercial forest area) that the need is greatest for forest management to bring about full stocking of timber stands, better species composition, and greater yields of quality timber.

Management plans are already in operation on most of the State-owned forest land and on the Allegheny National Forest. Advice and help are available to private forest landowners through the Pennsylvania Department of Forests and Waters.

STAND IMPROVEMENT

Growing-stock trees of relatively high vigor and quality, for the site and type, that have no defects that preclude potential use for the primary product, and that would be left in silvicultural cutting or in cultural operations as potentials for intermediate or final harvest, are designated as desirable trees. Only 5 percent of the commercial forest land in the State is in stands that have a desirable tree stocking of 40 percent or more.

In a study of timber-management opportunities in Pennsylvania, Webster[5] concluded that high-quality timber production could be increased most efficiently by first concentrating effort on the thinning of hardwood-poletimber stands on the better sites.

Only a small part of the 786,000 acres that are medium to well stocked with desirable trees falls into the hardwood-poletimber category—perhaps 100,000 acres, more or less. Thinning operations in hardwood-poletimber stands should remove all cull trees 5 inches d.b.h. and larger and one-half of the low-quality trees in each diameter class 5 inches and larger.

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[5] Webster, Henry H. TIMBER MANAGEMENT OPPORTUNITIES IN PENNSYLVANIA. NE. Forest Exp. Sta., Sta. Paper 137. 37 pp., illus. Upper Darby, Pa. 1960.

The result of this kind of thinning would be a stand that would produce more than one dollar's worth of additional timber for every dollar invested.

Most of the commercial forest land in the State is less than 40 percent stocked with desirable trees. It is feasible to carry out a cleaning and cull-tree removal on some of this land that would bring in a profitable return on the investment. This operation would consist of removing or girdling all cull trees 2 inches d.b.h. and larger, all low-value hold-over trees (12 inches d.b.h. and larger) from former stands, and one-half of low-quality species in each diameter class from 2 to 10 inches.

BETTER STOCKING

Almost 2 million acres of commercial forest land either are poorly stocked with growing-stock trees or are nonstocked. This land has a low growth potential in its present condition. Much of the area would have to have some site preparation through silvicides, girdling, and/or root-raking before planting or seeding.

Some of the 300,000 acres of forest land that are less than 10 percent stocked are abandoned farm cropland and pasture. Much of this poorly stocked forest land could be machine-planted. The cost of field planting was about $20 per thousand trees in 1960 and now may be slightly greater.

The State tree nurseries have supplied planting stock at minimum cost to landowners for many years. Most of the planting has been with white pine, red pine, and Norway spruce on open or lightly stocked forest land. The total number of seedlings grown and distributed for planting now amounts to 436 million trees. This would be equivalent to a planted area of over 400,000 acres if all seedlings survived.

Outlook For The Timber Supply

DEMAND FOR TIMBER PRODUCTS WILL INCREASE

The demand for timber products from the timber resources in Pennsylvania is assumed to be quite like that for the Nation as a whole. Between 1962 and 2000 the National demand is anticipated to increase about 80 percent.[6] This is tied in to an increase of 74 percent in population and a slight increase of per capita consumption from 63 to 64 cubic feet.

Consumption of roundwood in the United States from all sources by the year 2000 is predicted to be as follows:

- Sawlog consumption will increase 42 percent.
- Veneer and pulpwood consumption each will increase 2.7 times.
- Miscellaneous industrial wood consumption will decrease slightly.

The timber-products output from roundwood in Pennsylvania for 1954 and for 1964 shows that cubic-foot volume of sawlogs and veneer logs increased 1 percent; pulpwood volume increased 80 percent; fuelwood volume decreased 60 percent; and volume of miscellaneous industrial products decreased 20 percent.

As the timber inventory increases in the larger diameter classes, we can expect a greater production of sawlogs and veneer logs than in the past 10 years. Just recently a new veneer and lumber mill has been built; a dimension-stock mill has been established; and several new furniture plants have been located within the State.

Fuelwood will continue to decrease to a point where it will make up an insignificant amount of the total products output. It has decreased from 25 to 11 percent of the total output volume in 1964, and only two-thirds of this came from growing-stock trees. Also, in line with the national trend, the volume of output of miscellaneous industrial products will continue to decline.

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[6] United States Forest Service. TIMBER TRENDS IN THE UNITED STATES. Forest Resource Rep. 17. 235 pp., illus. 1965.

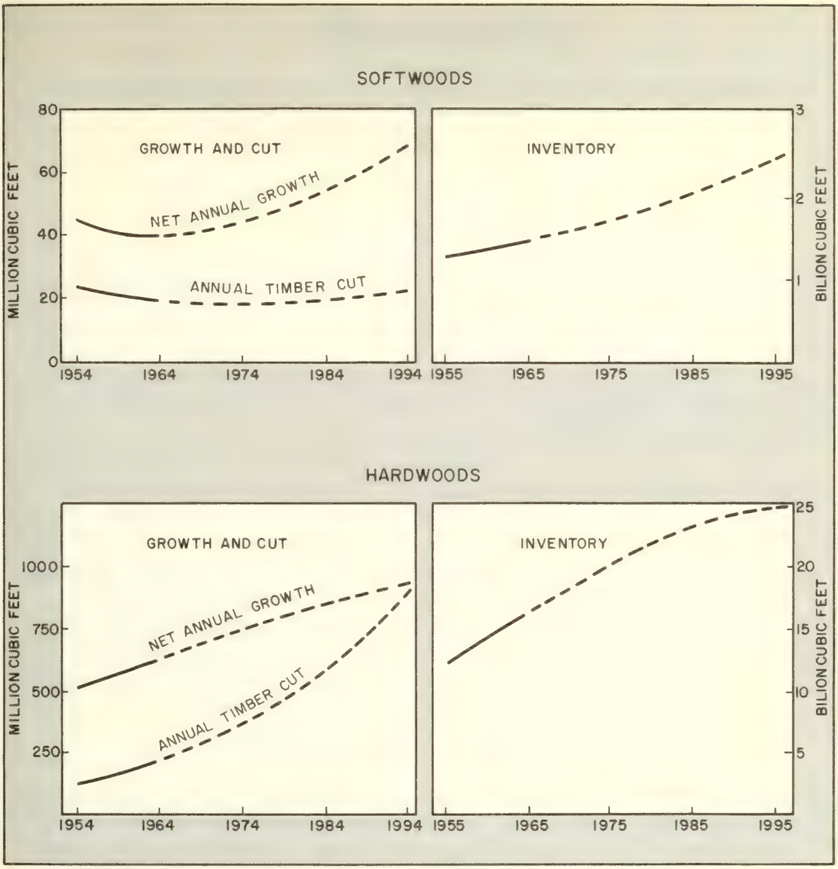
The demand for pulpwood increased considerably in the period between surveys. This increased demand is due to expansion of existing woodpulp mills in Pennsylvania. Between 1952 and 1965 these mills expanded their pulping capacity by 75 percent. Production decreased slightly in 1965, but this is a temporary decline and the production is expected to rise again soon. Part of the decline was due to the increased use of chips from plant byproducts. (Volume of chips doubled between 1964 and 1965.) A new integrated pulp and paper mill is being built in Wyoming County in the northeastern part of the State. Its wood requirements will further increase the demand for pulpwood.

ANNUAL CUT CAN BE GREATLY INCREASED

Based upon the 10-year period between surveys, the average annual timber cut in Pennsylvania is 204 million cubic feet. The average annual growth for the same period is three times as great—615 million cubic feet. Even for this short a period, it is evident that the amount of timber cut can be greatly increased, and at the same time the average volume per acre of forest land can be increased.

For some species, the annual cut should be decreased. At present their volume of growth is less than the volume being cut. Pitch pine and Virginia pine are the only softwoods that are being overcut. Their inventory volume both of growing stock and of sawtimber dropped by one-third because of the unfavorable growth-cut ratio.

Only three hardwood species were overcut—beech, yellow birch, and basswood. They made up around 5 percent of the hardwood inventory volume in 1955. Their volume of growing stock dropped about 20 percent and their volume of sawtimber dropped about 30 percent. Now they make up less than 3 percent of the hardwood inventory volume. All other species are growing at a much faster rate than they are being cut.



Net annual growth is more than enough to sustain a much greater annual cut.

Although the cut of softwood growing stock decreased between surveys, it seems reasonable to expect the softwood cut to level off for a few years and then increase at a moderate rate each year thereafter.

The annual cut of hardwoods has increased considerably during the past 10 years, and it is expected to increase in line with the anticipated increased demand for timber products for the next 30 years. Even with the increased demand, at the end of the 30-year projections net annual growth of some hardwoods will still exceed the annual cut.

Appendix

DEFINITIONS OF TERMS

Forest Area

Forest-land area.—This includes: (a) lands that are at least 10 percent stocked with trees of any size and are capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and that has not been developed for other use; and (c) afforested areas. (Forest tracts of less than 1 acre, isolated strips of timber less than 120 feet wide, and abandoned fields and pastures not yet 10 percent stocked with trees are excluded.)

Commercial forest-land area.—Forest land that is (a) producing, or physically capable of producing, crops of industrial wood; (b) economically available now or prospectively; and (c) not withdrawn from timber utilization through statute, ordinance, or administrative order.

Noncommercial forest-land area.—Forest land that is (a) withdrawn from timber utilization through statute, ordinance, or administrative order, but that otherwise qualifies as commercial forest land; or (b) incapable of yielding industrial wood products because of adverse site conditions.

Timber Volume

Growing stock.—Net volume, in cubic feet, of live sawtimber and poletimber trees (see definitions under "Class of Timber") from stump to a minimum 4-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot.

Sawtimber volume.—Net volume in board feet, International 1/4-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Standard cord.—A unit of measure for stacked wood encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates by applying a factor of 80 cubic feet of wood (inside bark) per rough cord.

Tree Classes

All trees.—All live sawtimber and poletimber trees, saplings and seedlings, and all live rough or rotten trees.

Growing-stock trees.—All live sawtimber trees, poletimber trees, and saplings and seedlings, except rough or rotten trees. (See definitions under "Class of Timber.")

Desirable trees.—All growing-stock trees that now or prospectively have positive stumpage value and are likely to remain in the stand for at least 10 years if not cut or otherwise deliberately killed.

Sawtimber trees are considered to have positive stumpage value now if they have a grade-1 or -2 butt log. Exceptions are made for several species that can have a lower quality butt log.

Poletimber trees are considered to have positive stumpage value if they will meet the above sawtimber tree requirements before becoming mature.

Stocking Classes

Stocking is the degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand compared to the basal area and/or number of trees required to fully utilize the growth potential of the land. The actual stocking at a point was evaluated against a standard of 75 square feet of basal area per tree for trees 5.0 inches d.b.h. and larger, or its equivalent in numbers of trees per acre for seedlings and saplings. The stocking percentage for a sample plot is derived from the stocking for each of the 10 points. Three categories of stocking are used:

All live trees.—These are used in the classification of forest land and forest types.

Growing-stock trees.—These are used in the classification of stand-size classes.

Desirable trees.—These are used in the classification of area-condition classes.

Stand-Size Classes

Stand.—A growth of trees on a minimum of 1 acre of forest land that is at least 10 percent stocked by forest trees of any size.

Sawtimber stands.—Stands that are at least 10 percent stocked with growing-stock trees and have half or more of this stocking in sawtimber and poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands that are at least 10 percent stocked with growing-stock trees and have half or more of this stocking in sawtimber and poletimber trees, and with poletimber stocking exceeding that of sawtimber stocking.

Sapling-and-seedling stands.—Stands that are at least 10 percent stocked with growing-stock trees and in which saplings and/or seedlings make up a plurality of this stocking.

Nonstocked areas.—Commercial forest lands that are less than 10 percent stocked with growing-stock trees.

Area-Condition Classes

Desirable.—Areas that are stocked 70 percent or more with desirable trees.

Moderate and favorable.—Areas that are stocked 40 to 70 percent with desirable trees and in which 30 percent or less of the area is controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Moderate and unfavorable.—Areas that are stocked 40 to 70 percent with desirable trees and in which more than 30 percent of the area is controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Poor but favorable.—Areas that are stocked less than 40 percent with desirable trees and have adequate seed sources and seedbeds favorable to natural restocking.

Poor but unfavorable.—Areas that are stocked less than 40 percent with desirable trees and have inadequate seed sources and/or seedbeds unfavorable to natural regeneration.

Forest Cover Types

The forest-type classification of each sample plot is based upon the majority of stocking by all live trees of various species. When no indicator species makes up a majority, the forest type is determined on the basis of plurality of stocking.

White pine.—Forests in which 50 percent or more of the stand is eastern white pine. In Pennsylvania it includes a small acreage in the hemlock type.

Spruce.—Forests in which 50 percent or more of the stand is any species of spruce.

Virginia-pitch pine.—Forests in which 50 percent or more of the stand is Virginia pine, pitch pine, or other yellow pines, singly or in combination.

Oak-pine.—Forests in which 50 percent or more of the stand is hardwood, usually upland oaks, but in which pines make up 25 to 49 percent of the stand. This type includes a small acreage in the eastern redcedar-hardwood type.

Oak-hickory.—Forests in which 50 percent or more of the stand is upland oaks or hickory, singly or in combination, except where pines comprise 25 to 49 percent, in which case the stand would be classified oak-pine. It also includes the yellow-poplar—oak forest type.

Oak-gum.—Bottomland forests in which 50 percent or more of the stand is blackgum, sweetgum, or oaks, singly or in combination, except where pines comprise 25 to 49 percent, in which case the stand would be classified as oak-pine.

Elm-ash-red maple.—Forests in which 50 percent or more of the stand is American elm, black ash, or red maple, singly or in combination. When all three species are present, this signifies a wet site. In Pennsylvania predominantly red maple stands on upland sites make up most of the acreage in this broad type.

Maple-beech-birch.—Forests in which 50 percent or more of the stand is sugar maple, beech, or yellow birch, singly or in combination. It includes the black cherry forest type.

Aspen-birch.—Forests in which 50 percent or more of the stand is aspen, paper birch, gray birch, or pin cherry, singly or in combination.

Class of Timber

Sawtimber trees.—Trees of commercial species that: (a) are of the following minimum diameters at breast height—softwoods 9.0 inches and hardwoods 11.0 inches; and (b) contain at least a 12-foot merchantable sawlog. (A merchantable sawlog is the portion of a live tree that meets the minimum log-grade specifications, as defined under log-grade classification.) The sawlog portion is that part of the tree between the stump and the top of the last merchantable sawlog.

Poletimber trees.—Trees of commercial species that meet regional specifications of soundness and form, and are of the following diameters at breast height; softwoods 5.0 to 9.0 inches; hardwoods 5.0 to 11.0 inches. Such trees will usually become sawtimber trees if left to grow.

Sapling-and-seedling trees.—Trees of commercial species that are less than 5.0 inches in diameter at breast height and of good form and vigor.

Rough or rotten trees.—Live trees of sawtimber or poletimber size that do not contain at least one 12-foot sawlog now or prospectively because of roughness, poor form, or rot, or because they are of noncommercial species.

Log Grades

The standard-lumber log grades for hardwoods, white pine, and the yellow pines used in the resurvey of Pennsylvania are outlined in the following figures:

HARDWOOD TIE-AND-TIMBER LOGS

Grade Factors		*Specifications*
Position in tree		Butts and uppers
Scaling diameter (inches)		8+
Length, without trim (feet)		8+
Clear cuttings		No requirements. Not graded on cutting basis.
Max. sweep allowance		One-fourth d.i.b. of small end for half logs, and one-half d.i.b. for logs 16 feet long.
Sound surface defects permitted	Single knots	Any number, if none has an average collar* diameter that is more than one-third of log diameter at point of occurrence.
	Whorled knots	Any number, provided the sum of the collar diameters does not exceed one-third the log diameter at point of occurrence.
	Holes	Any number not exceeding knot specifications if they do not extend more than 3 inches into the contained tie or timber.
Unsound** surface defects permitted		Any number and size if they do not extend into contained tie or timber. If they extend into contained tie or timber, they shall not exceed size, number, and depth of limits for sound defects.

* Knot collar is the average of the vertical and horizontal diameters of the limb or knot swelling as measured flush with the surface of the log.

** Interior defects are not visible in standing trees. They are considered in grading cut logs. No interior defects are permitted except one shake not more than one-third the width of the contained tie or timber, and one split not more than 5 inches long.

HARDWOOD STANDARD-LUMBER LOGS

*Grade Factors**		*Specifications*							
		Log grade 1			*Log grade 2*				*Log grade 3*
Position in tree		Butts only	Butts & uppers		Butts & uppers				Butts & uppers
Minimum diameter (inches)		[1] 13-15	16-19	20+	[2] 11	12+			8+
Minimum length (feet)		10+	10+	10+	10+	8-9	10-11	12+	8+
Clear** cuttings on each of the 3 best faces	Min. length (feet)	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	—
	Min. yield face length	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Max. sweep and crook allowance; % of gross vol.		15			30				50
Max. cull and sweep allowance; % of gross vol.		[3] 40			[4] 50				50

* End defects, although not visible in standing trees, are important in grading cut logs. Instructions for dealing with this factor are contained in U.S. Forest Prod. Lab. Rpt. D1737.

** A clear cutting is a portion of a face free of defects, extending the width of the face. A face is one-fourth the surface of the log as divided lengthwise.

[1] Ash and basswood butts can be 12 inches if otherwise meeting the requirements for small No. 1's.

[2] 10-inch logs of all species can be No. 2 if otherwise meeting the requirements for small No. 1's.

[3] Otherwise No. 1 logs with 41-50 percent cull can be No. 2.

[4] Otherwise No. 2 logs with 51-60 percent cull can be No. 3.

WHITE PINE LOG GRADES
TRIAL SPECIFICATIONS (REVISED)—1963

Log grade	Minimum size		Sweep or crook allowance	Total cull allowance including sweep	Maximum weevil injury	Allowable knot size on 3 best faces or minimum clearness on 4 faces
	Diameter	*Length*[1]				
	Inches	*Feet*	*Percent*	*Percent*	*Number*	*Inches*
No. 1	12 & 13	8-16	20	50	0	4 faces free of knots ½″ or larger, full length of log.
(Select)	14+	10-16	20	50	0	2 faces free of knots ½″ or larger, full length of log; or 4 faces free of knots ½″ or larger 50 percent of log (6′ minimum length)[2].
No. 2 (Finish)	6+	8-16	30	50	0	Sound red knots $\overset{=}{<} \frac{D}{6}$ and no larger than 3″[3]. Black knots: Butt logs $\overset{=}{<}$ D/12 and no larger than 1½″. Upper logs $\overset{=}{<}$ D/10 and no larger than 1½″, or 4 faces free of knots ½″ or larger, 50 percent length of log.
No. 3 (Premium)	6+	8-16	40	50	8′ logs: 1 weevil 10′+ logs: 2 weevils	Sound red knots $\overset{=}{<}$ D/3 and no larger than 5″. Black knots $\overset{=}{<}$ D/6 and no larger than 2½″.
No. 4 (Standard)	6+	8-16	50	50	No limit	No limit

[1] Plus trim.

[2] If the sum of the diameters of sound red knots plus 2X (sum of the diameters of dead or black knots) in inches is $\overset{=}{<}$ ½ the diameter of the log (in inches).

[3] $\overset{=}{<}$ **means equal to or less than.**

YELLOW PINE LOG GRADES

Log grade	Minimum diameter and maximum aggregate knot criteria		
	With 4 visible faces	*With 3 visible faces*	*With 2 visible faces*
No. 1	$D = >17$ and $5K = <D$	$D = >17$ and $7K = <D$	$D = >17$ and $10K = <D$
No. 2	$D = >10$ and $2K = <D$ $<5K$	$D = >10$ and $3K = <D$ $<7K$	$D = >10$ and $4K = <D$ $<10K$
No. 3	$D = >5$ and $D < 2K$	$D = >5$ and $D < 3K$	$D = >5$ and $D < 4K$
No. 4	$D = >5$, but not qualified for higher grade after compliance with the following degrade rules:		

(A) Degrade any log one grade if D equals or is less than 3 times sweep of at least 3 inches.

(B) Then degrade any non-Grade No. 4 log one grade if massed heart-rot hyphae visible on circumferential log surface suggest that fruiting has occurred or is imminent.

(C) Then degrade any Grade No. 3 log to Grade No. 4 if bad knots are too dispersed for containment in a 90-degree radial sector extending 1/4 of log length.

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[1] From Forest Service, "1953 Interim Log Grades for Southern Pine," October 1953.

Annual Growth and Cut

Net annual growth of sawtimber.—The average annual change (resulting from natural causes) in net board-foot volume of live sawtimber on commercial forest land during the period between surveys.

Ingrowth of sawtimber.—The net board-foot volume of trees that first became sawtimber trees during the period between surveys as measured at the end of the period, and converted to an average annual ingrowth.

Annual mortality of sawtimber.—The average net board-foot volume removed yearly from live sawtimber on commercial forest land through death from natural causes.

Annual cut of live sawtimber.—The net board-foot volume of live sawtimber trees cut or killed in logging, land-clearing, or cultural operations on commercial forest land during a year. For tables 21 and 23, the average annual cut of sawtimber is based on trend levels between 1954 and 1964 as developed from remeasured plots. For table 31, sawtimber cut by products for 1964 is based on estimates of timber products output obtained from a canvass of forest industries.

Net annual growth of growing stock.—The average annual change (resulting from natural causes) in net cubic-foot volume of live sawtimber and poletimber trees on commercial forest land.

Ingrowth of growing stock.—The net cubic-foot volume of trees that first became a part of growing stock during the period between surveys as measured at the end of the period, and converted to an average annual ingrowth.

Annual mortality of growing stock.—The average net cubic-foot volume removed yearly from growing stock through death from natural causes.

Annual cut of growing stock.—The net cubic-foot volume of live sawtimber and poletimber trees cut or killed in logging, land-clearing, or cultural operations on commerical forest land during a year. For tables 21 and 22, the average annual cut of growing stock is based on trend levels between 1954 and 1964 as developed from remeasured sample plots. For table 30, growing stock cut by products for 1964 is based on estimates of timber products output obtained from a canvass of forest industries.

FOREST-SURVEY METHODS

Forest area and timber volume estimates are based upon information obtained from two sets of aerial photographs (10 or more years between the two) and sample photo plots and ground plots. Photo plots were pinpointed on each set of aerial photographs so they were distributed uniformly over the entire State. Each photo plot was classified as either forest or nonforest, and each forest plot was classified into sampling strata. These strata were stand-size classes on the initial survey and were cubic-foot-volume-per-acre classes on the resurvey.

Field crews on the first survey inspected on the ground many sample plots selected from the photo plots. Area, volume, and growth data were recorded. These data were the basis for *The Timber Resource in Pennsylvania,* published in 1958.

A sample of 859 of the initial ground plots were visited on the resurvey. These consisted of 158 plots on the Allegheny National Forest that was one of the 10 geographic sampling units. It also included 175 plots on State forest land that made up three more sampling units. The remaining 526 plots were on all other land and were distributed throughout the State in six sampling units. Plot centers were relocated and trees were retallied. The two tallies were reconciled with each other on the plot.

Data from the remeasured plots were used to obtain the first part of a combined estimate of current forest area and timber volume, and estimates of net annual growth, mortality, and timber cut. Regression equations calculated from the remeasured plots brought up to date the volume estimates of the first survey.

On the initial survey, each sawtimber tree was measured for d.b.h., merchantable sawlog height, and number of bolts in the upper stem. These were used with appropriate volume tables for each tree's volume in cubic feet and in board feet. On the resurvey, the number of upper stem bolts were recorded for sawtimber trees on only the remeasured plots. Data from the remeasured plots were developed into gross cubic-foot volume equations for 17 species groups from which volume per tree was obtained. Board-feet per cubic foot ratios were also developed to obtain board-foot volume estimates.

In addition to the remeasured plots, 5,117 new ground plots were established from photo plots on the most recent aerial photographs. More than half of these—2,998—were on the Allegheny National Forest, which was sampled much more intensively than the other units. On State Forest land 456 new ground plots were established. On all other land in the six geographic units, a total of 1,663 new ground plots were established.

The two sets of estimates were weighted by their variance reciprocals and combined. This resulted in the new estimate of acreage for each forest area breakdown shown in the tables of this report. The associated sampling errors for these breakdowns were also obtained. The new estimates of timber volumes were produced in the same way.

Estimates of average net annual growth, mortality, and timber cut were based entirely upon the 860 remeasured plots. The volume of growing stock on the plots at time of remeasurement (consisting of both live growing-stock trees and trees that were cut) minus the volume of growing-stock trees on the plots at the time of the forest survey equals net volume growth for the years between measurement.

Stump measurements were used to estimate volumes of cut trees. Measurement of dead trees that were initially classified as live growing-stock trees provided the estimates of mortality.

These estimates for the period between surveys were converted to average net annual growth, mortality, and timber cut by dividing by the number of years between measurements for each plot.

Estimates of timber cut for the single year of 1964 were based upon a canvass of the forest industries, and do not coincide with the average annual cut estimates for the 10-year period that were calculated from the remeasured plots.

Estimates of timber volumes for 1955 were recomputed for more reliable estimates of changes between surveys. The differences between reported and computed volumes for 1955 do not reflect real changes but are the result of differences in volume tables, field interpretations of growing stock, height measurements, and technique errors. The recomputed volume estimates instead of those shown in the 1958 timber resource report were used whenever differences between the two surveys were discussed.

RELIABILITY OF THE ESTIMATES

The forest-area and timber-volume data presented in this report are based on a carefully designed sample of forest conditions throughout Pennsylvania. However, since neither every acre nor every tree in the State was measured, the figures in this report are the best estimates. A measure of the reliability of these estimates is given by a sampling error. Each estimate in this report had a computed sampling error. Included with most of the State statistical tables are the corresponding sampling errors for row totals and column totals. For individual counties, only the sampling errors of total commercial forest area, total growing-stock volume, and total board-foot volume are shown.

Briefly, here is how the sampling error indicates reliability. Our report of the total growing-stock volume in Pennsylvania, 17,860 million cubic feet, has an associated sampling error of 1.3 percent (232 million cubic feet). This means that our best estimates of the total growing-stock volume in 1965 is 17,860 million cubic feet. And if there are no errors in procedure, the odds are 2 to 1 that if we repeated the resurvey in the same way, the new estimate of growing-stock volume would be between 17,628 million and 18,092 million cubic feet (17,860 ±232). Similarly, the odds are 19 to 1 that it would be within ±464 million cubic feet of the present estimate, and 300 to 1 that it would be within ±696 million cubic feet.

The computed sampling error is not a complete measure of reliability; there are other sources of error that this term does not include. There could be imperfections in our volume tables and equations and errors in field measurement. Procedural errors were kept to a minimum by careful training of all personnel, frequent inspection of field work, and application of the most reliable survey methods.

Computed sampling errors for the totals shown in the statistical tables are:

	Sampling error (percent)
Commercial forest area (16.7 million acres)	1.4
Growing-stock volume (17.9 billion cubic feet)	1.3
Sawtimber volume (26.3 billion board feet)	4.0
Net annual growth (0.6 billion cubic feet)	5.0
Annual timber cut (0.2 billion cubic feet)	14.0

SPECIES TALLIED

Only the commercial tree species[7] found on forest survey sample plots in Pennsylvania are listed below. Other species that are found in Pennsylvania are not included.

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[7] Little, Elbert L., Jr. CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). U. S. Dep. Agr., Agr. Handbook 41, 472 pp. 1953.

Softwoods

Virginia pine	*Pinus virginiana*
Other yellow pines:	
Pitch pine	*Pinus rigida*
Table-Mountain pine	*Pinus pungens*
Eastern white pine	*Pinus strobus*
Red pine	*Pinus resinosa*
Eastern hemlock	*Tsuga canadensis*
Other softwoods:	
Spruce	*Picea* species
Tamarack	*Larix laricina*
Eastern redcedar	*Juniperus virginiana*
Northern white-cedar	*Thuja occidentalis*

Hardwoods

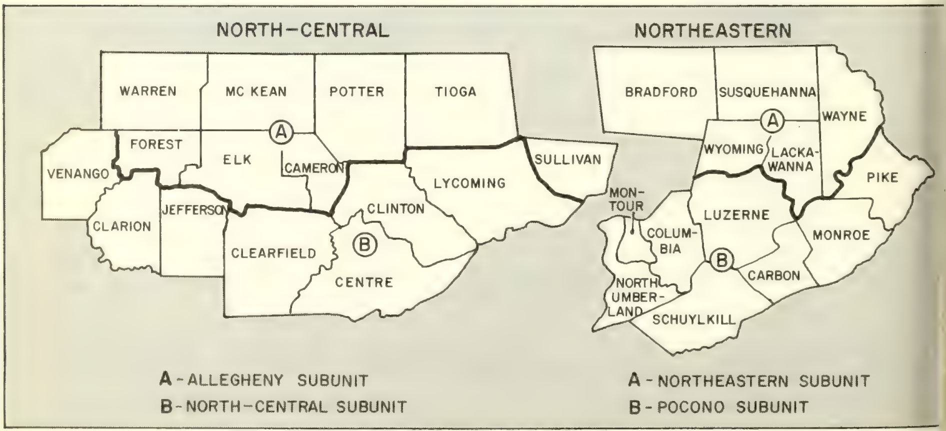
Select white oaks:	
White oak	*Quercus alba*
Swamp white oak	*Quercus bicolor*
Bur oak	*Quercus macrocarpa*
Select red oaks:	
Northern red oak	*Quercus rubra*
Other white oaks:	
Chestnut oak	*Quercus prinus*
Post oak	*Quercus stellata*
Other red oaks:	
Black oak	*Quercus velutina*
Scarlet oak	*Quercus coccinea*
Pin oak	*Quercus palustris*
Willow oak	*Quercus phellos*
Hickory	*Carya* species
Yellow birch	*Betula alleghaniensis*
Sugar maple	*Acer saccharum*
Soft maples:	
Red maple	*Acer rubrum*
Silver maple	*Acer saccharinum*
American beech	*Fagus grandifolia*
Blackgum	*Nyssa sylvatica*
Sweetgum	*Liquidambar styraciflua*
Ash	*Fraxinus* species
Aspen	*Populus* species
American basswood	*Tilia americana*

Yellow-poplar	*Liriodendron tulipifera*
Black walnut	*Juglans nigra*
Black cherry	*Prunus serotina*
American sycamore	*Platanus occidentalis*
Black locust	*Robinia pseudoacacia*
Other hardwoods:	
Butternut	*Juglans cinerea*
Cucumbertree	*Magnolia acuminata*
Elm	*Ulmus* species
Flowering dogwood	*Cornus florida*
Paper birch	*Betula papyrifera*
Sweet birch	*Betula lenta*
Willow	*Salix* species
Yellow buckeye	*Aesculus octandra*

STATISTICAL DATA

Tables of statistical data for forest area, timber volume, annual growth, and cut for the entire State (National Standard Tables) and associated sampling errors for subtotals and totals appear first (tables 1 to 35).

These are followed by a series of tables that give statistics for each of the six geographic units (tables 36 to 83). The North-Central unit referred to in the text was further divided into northern and southern groups of counties to provide more homogeneous forest conditions throughout each group. The northern group of counties makes up the new Allegheny unit, and the southern group makes up the revised North-Central unit. The Northeastern



The North-Central unit was further divided into units A (Allegheny) and B (North-Central) and the Northeastern unit was further divided into units A (Northeastern) and B (Poconos).

unit was also divided for the same reason—the northern counties make up the revised Northern unit and the southern counties the Pocono unit.

After the geographic-unit tables are the county statistics (tables 84 to 93). These county estimates have been prepared for users who want statistics for a county or group of counties. Estimated sampling errors for county totals only are shown. The users of these data are urged to evaluate the sampling error for each total in relation to their planning needs, use of the data, and decisions based upon these data.

County statistics were computed from means and variances of seven volume strata (stratified from aerial photographs) for each of the geographic units. These were applied to the volume strata within the county, assuming homogeneous forest conditions throughout each stratum. If homogeneity does not exist, the actual errors of some county estimates may be greater than the calculated sampling errors.

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Table 1. — Land area of Pennsylvania, by land classes, 1965

Land class	Area	
	Acres	*Percent*
Commercial forest land	16,718,000	58.0
Unproductive forest land	160,000	.6
Productive-reserved forest land	194,000	.7
Total forest land	17,072,000	59.3
Nonforest land[1]	11,732,000	40.7
All land[2]	28,804,000	100.0

Note: Sampling errors for major breakdowns of area are given in table 10.

[1] Includes 114,000 acres of water according to Survey standards of area classification but defined by the Bureau of the Census as land.

[2] Land area from the 1964 Census of Agriculture.

Table 2. — Area of commercial forest land in Pennsylvania, by ownership classes, 1965

Ownership class	Area	
	Acres	*Percent*
National Forest	466,000	2.8
Other Federal	30,000	.2
State Forests	1,695,000	10.1
Other State	951,000	5.7
County and municipal	242,000	1.4
Forest industry:		
Pulp and paper	213,900	1.3
Lumber	224,900	1.3
Other	171,000	1.0
Total forest industry	609,800	3.6
Farmer-owned	3,645,000	21.8
Miscellaneous private	9,079,200	54.4
All ownerships	16,718,000	100.0

Table 3. — Area of commercial forest land in Pennsylvania, by stand-size and ownership classes, 1965

(In thousands of acres)

Stand-size class	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
Sawtimber stands	7,332	253	1,235	241	5,603
Poletimber stands	5,817	200	1,326	238	4,053
Sapling-seedling stands	3,251	7	334	131	2,779
Nonstocked areas	318	6	23	0	289
All classes	16,718	466	2,918	610	12,724

Table 4. — Area of commercial forest land in Pennsylvania, by stand-volume classes for sawtimber and other stand-size classes, 1965

(In thousands of acres)

Stand volumes per acre (board feet)[1]	Area by stand-size classes		
	All stands	Sawtimber stands	Other stands
Less than 1,500	10,835	1,872	8,963
1,500 to 5,000	4,841	4,418	423
More than 5,000	1,042	1,042	0
All classes	16,718	7,332	9,386

[1] Net volume, International ¼-inch rule.

Table 5. — Area of commercial forest land in Pennsylvania, by stocking classes based on alternative stand components, 1965

(In thousands of acres)

Stocking class (percent)	Stocking classified in terms of—		
	All trees	Growing-stock trees	Desirable trees
90 to 100	8,850	1,417	125
80 to 90	3,828	3,117	45
70 to 80	1,951	4,193	64
60 to 70	696	2,322	52
50 to 60	546	2,129	307
40 to 50	329	1,584	193
30 to 40	242	854	781
20 to 30	122	584	1,571
10 to 20	121	200	3,416
Less than 10	33	318	10,164
All areas	16,718	16,718	16,718

Table 6. — Area of commercial forest land in Pennsylvania, by stocking classes of growing-stock trees and stand-size classes, 1965

(In thousands of acres)

Stocking class (percent)	All stands	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Non-stocked stands
70 or more	8,727	4,671	2,914	1,142	0
40 to 70	6,035	2,244	2,459	1,332	0
10 to 40	1,638	417	444	777	0
Less than 10	318	0	0	0	318
All classes	16,718	7,332	5,817	3,251	318

Table 7. — Area of commercial forest land in Pennsylvania, by area-condition and ownership classes, 1965

(In thousands of acres)

Area-condition class[1]	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
Desirable	234	186	—	—	48
Moderate and favorable	—	—	—	—	—
Moderate and unfavorable	552	228	51	10	263
Poor but favorable	234	6	40	—	188
Poor but unfavorable	15,698	46	2,827	600	12,225
All classes	16,718	466	2,918	610	12,724

[1] For complete definitions of area-condition classes see Appendix.

Table 8. — Area of commercial forest land in Pennsylvania, by growth-per-acre and ownership classes, 1965

(In thousands of acres)

Growth-per-acre class (cubic feet)	All ownerships	National Forest	Other public	Forest industry	Farmer and misc. private
120 or more	371	26	142	38	165
85 to 120	1,165	22	196	85	862
50 to 85	3,872	105	638	161	2,968
Less than 50	11,310	313	1,942	326	8,729
All classes	16,718	466	2,918	610	12,724

Table 9. — Area of commercial forest land in Pennsylvania, by forest types, 1965

(In thousands of acres)

BY OWNERSHIP CLASSES

Forest type	All ownerships	Public ownerships	Private ownerships
White pine	930	66	864
Spruce	19	7	12
Virginia-pitch pine	208	12	196
Oak-pine	135	31	104
Oak-hickory	7,671	1,720	5,951
Oak-gum	200	21	179
Elm-ash-red maple	2,072	206	1,866
Maple-beech-birch	3,545	1,151	2,394
Aspen-birch	1,938	170	1,768
All types	16,718	3,384	13,334

BY STAND-SIZE CLASSES

Forest type	All stands	Saw-timber stands	Pole-timber stands	Sapling-seedling stands	Non-stocked stands
White pine[1]	949	653	222	74	—
Virginia-pitch pine	208	19	117	72	—
Oak-pine	135	70	32	33	—
Oak-hickory	7,671	3,688	2,929	957	97
Oak-gum	200	30	31	116	23
Elm-ash-red maple	2,072	1,020	763	268	21
Maple-beech-birch	3,545	1,743	1,356	357	89
Aspen-birch	1,938	109	367	1,204	258
All types	16,718	7,332	5,817	3,081	488

[1] Includes 19,000 acres of the spruce forest type.

Table 10. — Sampling errors for major area breakdowns in Pennsylvania, 1965

Table No.	Area breakdown classifications	Sampling error
		Percent
1	Commercial forest land	1.4
2	Ownership:	
	Public[1]	—
	Forest industry[1]	—
	Farmer-owned	6
	Miscellaneous private	3
	Farmer and misc. private	3
3	Stand-size class:	
	Sawtimber	3
	Poletimber	4
	Sapling-seedling	7
	Nonstocked	28
4	Stand volumes per acre (board feet):	
	Less than 1,500	2
	1,500 to 5,000	4
	More than 5,000	10
5	Stocking class (percent):	
	70 or more	4
	40 to 70	3
	10 to 40	8
	Less than 10	23
7	Area-condition class:	
	Desirable	11
	Moderate, favorable	—
	Moderate, unfavorable	16
	Poor, favorable	30
	Poor, unfavorable	2
8	Growth-per-acre class (cubic feet):	
	120 or more	36
	85 to 120	18
	50 to 85	9
	Less than 50	6
9	Forest type:	
	White pine	12
	Spruce	70
	Virginia-pitch pine	35
	Oak-pine	21
	Oak-hickory	3
	Oak-gum	38
	Elm-ash-red maple	7
	Maple-beech-birch	5
	Aspen-birch	11

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[1] Acreages in public and forest-industry holdings were obtained from ownership records and therefore have no sampling errors.

Table 11. — Area of noncommercial forest land in Pennsylvania, by forest types, 1965

(In thousands of acres)

Forest type	All areas	Productive-reserved areas	Unproductive areas
White pine	3	3	—
Oak-hickory	340	180	160
Maple-beech-birch	11	11	—
All types	354	194	160

Table 12. — Number of growing-stock trees on commercial forest land in Pennsylvania, by diameter classes and by softwoods and hardwoods, 1965

(In thousands of trees)

D.b.h. class (inches)	All species	Softwoods	Hardwoods
1.0- 2.9	3,463,332	357,193	3,106,139
3.0- 4.9	1,909,175	193,076	1,716,099
5.0- 6.9	1,043,999	101,087	942,912
7.0- 8.9	561,817	51,191	510,626
9.0-10.9	279,974	25,814	254,160
11.0-12.9	138,606	12,781	125,825
13.0-14.9	68,440	6,221	62,219
15.0-16.9	34,593	3,110	31,483
17.0-18.9	17,614	1,637	15,977
19.0-28.9	15,762	1,473	14,289
29.0 and larger	19	2	17
All classes	7,533,331	753,585	6,779,746

Table 13. — Number of cull and growing-stock trees on commercial forest land in Pennsylvania, by diameter groups and by softwoods and hardwoods, 1965

(In thousands of trees)

D.b.h. class (inches)	All trees[1]	Cull trees	Growing-stock trees
Softwoods:			
5.0 to 8.9	166,958	14,680	152,278
9.0 to 18.9	60,639	11,076	49,563
19.0 and larger	1,904	429	1,475
Total	229,501	26,185	203,316
Hardwoods:			
5.0 to 10.9	1,984,410	276,712	1,707,698
11.0 to 18.9	293,480	57,976	235,504
19.0 and larger	18,577	4,271	14,306
Total	2,296,467	338,959	1,957,508
All species	2,525,968	365,144	2,160,824

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[1] Number of salvable dead trees is negligible in Pennsylvania; therefore this item is omitted from this table.

Table 14. — Volume of timber on commercial forest land in Pennsylvania, by class of timber and by softwoods and hardwoods, 1965

(In millions of cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Sawtimber trees:			
Sawlog portion	6,675	757	5,918
Upper-stem portion	1,397	97	1,300
Total	8,072	854	7,218
Poletimber trees	9,788	623	9,165
All growing-stock trees	17,860	1,477	16,383
Sound cull trees:			
Sawtimber size	921	125	796
Poletimber size	637	35	602
Total	1,558	160	1,398
Rotten cull trees:			
Sawtimber size	399	16	383
Poletimber size	186	3	183
Total	585	19	566
Total, all timber	20,003	1,656	18,347

Table 15.—Net volume of growing stock and sawtimber on commercial forest land in Pennsylvania, by ownership classes, and softwoods and hardwoods, 1965

Ownership class	Growing stock (million cubic feet)			Sawtimber (million board feet)[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	667	46	621	1,090	127	963
Other public	3,340	177	3,163	4,910	488	4,422
Forest industry	775	59	716	1,094	127	967
Farmer and misc. private	13,078	1,195	11,883	19,175	2,526	16,649
All ownerships	17,860	1,477	16,383	26,269	3,268	23,001

[1] International ¼-inch rule.

Table 16. — Volume of growing stock and sawtimber on commercial forest land in Pennsylvania, by stand-size classes and by softwoods and hardwoods, 1965

Stand-size class	Growing stock, (million cubic feet)			Sawtimber (million board feet)[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Sawtimber stands	11,421	1,064	10,357	22,150	2,629	19,521
Poletimber stands	5,930	367	5,563	3,588	572	3,016
Sapling-seedling stands	499	45	454	515	67	448
Nonstocked areas	10	1	9	16	—	16
Total	17,860	1,477	16,383	26,269	3,268	23,001

[1] International ¼-inch rule.

Table 17. — Volume of growing stock on commercial forest land in Pennsylvania, by species and diameter classes, 1965
(In millions of cubic feet)

Species	Diameter class (inches at breast height)										
	All classes	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Virginia pine	47	17	12	10	5	3	—	—	—	—	—
Other yellow pines	121	11	34	23	29	14	6	4	—	—	—
White pine	543	78	131	70	50	57	55	26	71	4	1
Hemlock	733	162	152	125	96	72	46	34	46	—	—
Other softwoods[1]	33	11	15	2	2	2	1	—	—	—	—
Total softwoods	1,477	279	344	230	182	148	108	64	117	4	1
Select white oaks	1,455	219	278	262	203	144	120	63	145	18	3
Select red oaks	2,328	229	364	389	353	280	222	180	285	23	3
Other red oaks	1,203	111	178	200	183	174	121	76	148	12	—
Chestnut oak[2]	1,901	357	421	396	259	195	123	77	69	3	1
Hickory	470	70	80	102	86	51	35	18	25	3	—
Yellow birch	185	47	55	34	25	17	5	1	1	—	—
Sugar maple	1,239	247	310	264	153	97	63	33	63	9	—
Soft maple	2,611	640	631	577	346	184	107	54	69	1	2
Beech	651	113	110	131	92	76	56	29	44	—	—
Blackgum[3]	78	19	11	18	12	6	6	4	2	—	—
Ash	587	81	101	127	105	80	38	27	27	1	—
Aspen	483	124	170	122	46	17	3	1	—	—	—
Basswood	266	25	58	69	49	30	18	8	9	—	—
Yellow-poplar	501	22	43	51	75	107	70	54	68	11	—
Black walnut	36	5	7	5	3	7	2	4	3	—	—
Black cherry	1,453	138	237	301	265	205	134	83	86	4	—

Sycamore	34	1	1	3	4	4	4	—	14	3	—
Black locust	87	19	22	23	11	6	2	3	1	—	—
Other hardwoods	815	192	191	164	93	64	51	28	26	6	—
Total hardwoods	16,383	2,659	3,268	3,238	2,363	1,744	1,180	743	1,085	94	9
All species	17,860	2,938	3,612	3,468	2,545	1,892	1,288	807	1,202	98	10

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[1] Includes 10,300,000 cubic feet of spruce.
[2] Includes 11,300,000 cubic feet of other white oaks.
[3] Includes 2,300,000 cubic feet of sweetgum.

Table 18. — Volume of sawtimber on commercial forest land in Pennsylvania, by species and diameter classes, 1965

(In millions of board feet)[1]

Species	Diameter class (inches at breast height)								
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Virginia pine	54	30	15	9	—	—	—	—	—
Other yellow pines	281	71	108	59	25	18	—	—	—
White pine	1,343	222	173	233	239	109	339	22	6
Hemlock	1,566	421	344	288	189	131	192	1	—
Other softwoods[2]	24	8	9	4	3	—	—	—	—
Total softwoods	3,268	752	649	593	456	258	531	23	6

Continued

Table 18.—Continued

Species	Diameter class (inches at breast height)								
	All classes	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0-38.9	39.0 and larger
Select white oaks	2,219	—	619	454	377	207	481	69	12
Select red oaks	4,414	—	1,053	912	728	613	1,008	90	10
Other red oaks	2,235	—	543	540	387	242	482	41	—
Chestnut oak[3]	2,218	—	735	598	397	252	219	14	3
Hickory	652	—	243	150	113	56	80	10	—
Yellow birch	154	—	76	59	15	1	3	—	—
Sugar maple	1,352	—	450	321	203	114	230	34	—
Soft maples	2,464	—	1,060	608	348	193	243	6	6
Beech	963	—	270	248	185	101	159	—	—
Blackgum[4]	88	—	34	15	20	9	10	—	—
Ash	885	—	308	254	130	101	90	2	—
Aspen	223	—	157	55	7	4	—	—	—
Basswood	388	—	155	103	55	32	43	—	—
Yellow-poplar	1,197	—	216	337	215	176	228	25	—
Black walnut	55	—	10	20	4	12	9	—	—
Black cherry	2,511	—	792	663	458	276	310	12	—
Sycamore	99	—	11	10	15	—	48	15	—
Black locust	72	—	30	19	9	11	3	—	—
Other hardwoods	812	—	266	192	155	89	89	21	—
Total hardwoods	23,001	—	7,028	5,558	3,821	2,489	3,735	339	31
All species	26,269	752	7,677	6,151	4,277	2,747	4,266	362	37

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[1] International ¼-inch rule.

[2] Includes 9,000,000 board feet of spruce.

[3] Includes 20,400,000 board feet of other white oaks.

[4] Includes 2,200,000 board feet of sweetgum.

Table 19. — Volume of sawtimber on commercial forest land in Pennsylvania, by species and quality classes, 1965

(In millions of board feet)[1]

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Grade 4[2]
Softwoods:					
Virginia pine	54	1	5	29	19
Other yellow pines	281	6	29	128	118
White pine	1,343	75	172	583	513
Hemlock	1,566	1,566	—	—	—
Other softwoods	24	24	—	—	—
Total	3,268	1,672	206	740	650
Hardwoods:					
Select white oaks	2,219	266	497	982	474
Select red oaks	4,414	568	1,007	1,943	896
Other red oaks	2,235	158	395	970	712
Chestnut oak	2,218	128	372	1,068	650
Hickory	652	28	85	322	217
Yellow birch	154	3	22	114	15
Sugar maple	1,352	120	239	666	327
Soft maples	2,464	77	405	1,372	610
Beech	963	45	119	529	270
Blackgum	88	3	12	60	13
Ash	885	70	213	446	156
Aspen	223	9	28	152	34
Basswood	388	21	74	240	53
Yellow-poplar	1,197	190	249	494	264
Black walnut	55	1	9	34	11
Black cherry	2,511	256	499	1,306	450
Sycamore	99	4	14	66	15
Black locust	72	4	10	46	12
Other hardwoods	812	37	122	509	144
Total hardwoods	23,001	1,988	4,371	11,319	5,323
Hardwood quality (in percent)	100	9	19	49	23

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[1] International ¼-inch rule.

[2] Grade 4 applies only to the softwoods. For hardwoods the volumes in this column are for tie-and-timber logs.

Table 20. — Sampling errors, in percent, for major timber volume breakdowns in Pennsylvania, 1965

Table No.	Volume breakdown classification	Sampling error
		Percent
14.	Class of timber (cubic feet):	
	Softwood growing stock	9.3
	Hardwood growing stock	1.4
	Sawtimber trees	2.1
	Poletimber trees	1.8
	All growing stock	1.3
	Sound cull trees	3.9
	Rotten cull trees	3.8
	All live trees	1.2
15.	Ownership:	
	Growing Stock (cubic feet)	
	National Forest	1
	Other public	5
	Forest industry	13
	Farmer and other	2
	Sawtimber (board feet)	
	National Forest	2
	Other public	6
	Forest industry	16
	Farmer and other	3
	Softwood total	8
	Hardwood total	2
	All species	2
16.	Stand size:	
	Growing stock (cubic feet)	
	Sawtimber stands	2
	Poletimber stands	4
	Sapling-seedling stands	11
	Nonstocked areas	43
	Sawtimber (board feet)	
	Sawtimber stands	2
	Poletimber stands	6
	Sapling-seedling stands	16
	Nonstocked areas	60

Table No.	Volume breakdown classification	Sampling error	
		Cubic feet	Board feet
		Percent	
17-18.	Species:		
	Virginia pine	26	24
	Other yellow pines	18	16
	White pine	21	16
	Hemlock	9	10
	Other softwoods	34	38
	Select white oaks	6	7
	Select red oaks	4	4
	Other red oaks	6	8
	Chestnut oak	5	7
	Hickory	8	11
	Yellow birch	10	16
	Sugar maple	7	10
	Soft maples	4	7
	Beech	8	11
	Blackgum	13	20
	Ash	8	11
	Aspen	10	22
	Basswood	12	14
	Yellow-poplar	12	14
	Black walnut	26	33
	Black cherry	6	8
	Sycamore	30	33
	Black locust	15	22
	Other hardwoods	6	10
17-18.	Diameter class (inches):		
	5.0- 6.9	3	*
	7.0- 8.9	2	*
	[1]9.0-10.9	2	9
	11.0-12.9	2	3
	13.0-14.9	3	3
	15.0-16.9	4	3
	17.0-18.9	4	4
	19.0-28.9	4	5
	29.0 and larger	13	12

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* No volume in this classification.

[1] Board-foot sampling error for this class is for softwoods only.

Table 21. — Average net annual growth and annual cut of growing stock and sawtimber on commercial forest land in Pennsylvania, by species, 1954-64

Species	Growing stock		Sawtimber	
	Net annual growth	Annual timber cut	Net annual growth	Annual timber cut
	Thousand cubic feet		*Thousand board feet*[1]	
Softwoods:				
Yellow pines	5,584	1,958	9,270	6,100
White and red pines	14,799	5,894	37,972	21,209
Hemlock	20,638	12,239	47,611	42,502
Other softwoods	779	909	647	3,189
Total	41,800	21,000	95,500	73,000
Hardwoods:				
Select oak species	122,384	44,951	256,094	123,985
Other oaks	107,630	31,699	160,102	63,450
Hickory	16,469	4,073	21,555	9,700
Yellow birch	4,845	3,071	4,794	4,552
Sugar maple	51,297	8,542	60,309	14,457
Soft maples	102,223	25,549	105,035	33,871
Beech	20,018	10,573	32,140	24,241
Ash, walnut and black cherry	77,841	31,591	154,647	45,743
Yellow-poplar	15,098	4,805	37,003	14,565
Other hardwoods	55,350	18,164	73,381	31,008
Total	573,155	183,018	905,060	365,572
All species	614,955	204,018	1,000,560	438,572

Average net annual growth and annual cut are based on trend levels between 1954 and 1964 as developed from remeasured permanent sample plots.

[1] International ¼-inch rule.

Table 22. — Average net annual growth and annual cut of growing stock on commercial forest land in Pennsylvania, by ownership classes, and softwoods and hardwoods, 1954-64

(In thousands of cubic feet)

Ownership class	Net annual growth			Annual removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	29,214	1,430	27,784	2,825	17	2,808
Other public	125,499	6,600	118,899	13,491	320	13,171
Forest industry	37,648	1,044	36,604	9,022	2,442	6,580
Farmer and misc. private	422,594	32,726	389,868	178,680	18,221	160,459
All ownerships	614,955	41,800	573,155	204,018	21,000	183,018

Average net annual growth and annual cut are based on trend levels between 1954 and 1964 as developed from remeasured permanent sample plots.

Table 23. — Average net annual growth and annual cut of sawtimber on commercial forest land in Pennsylvania, by ownership classes, and softwoods and hardwoods, 1954-64

(In thousands of board feet)[1]

Ownership class	Net annual growth			Annual removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	51,311	4,078	47,233	5,873	79	5,794
Other public	184,150	13,276	170,874	31,187	1,615	29,572
Forest industry	84,561	3,085	81,476	25,765	8,628	17,137
Farmer and misc. private	680,538	75,061	605,477	375,747	62,678	313,069
All ownerships	1,000,560	95,500	905,060	438,572	73,000	365,572

Average net annual growth and annual cut are based on trend levels between 1954 and 1964 as developed from remeasured permanent sample plots.

[1] International ¼-inch rule.

Table 24. — Components of average net annual growth of growing stock and sawtimber on commercial forest land in Pennsylvania, by species group, 1954-64

Components	All species	Softwoods	Hardwoods
GROWING STOCK *Thousands of cubic feet*			
Growth on initial growing stock[1]	473,202	30,183	443,019
Ingrowth—saplings that became poletimber	208,224	15,317	192,907
Gross growth	681,426	45,500	635,926
Annual mortality	66,471	3,700	62,771
Net annual growth	614,955	41,800	573,155
SAWTIMBER *Thousands of board feet*[2]			
Growth on initial sawtimber inventory	364,295	59,411	304,884
Ingrowth—poletimber trees that became sawtimber	688,809	41,115	647,694
Gross growth	1,053,104	100,526	952,578
Annual mortality	52,544	5,026	47,518
Net annual growth	1,000,560	95,500	905,060

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[1] Including growth on trees that were cut.

[2] International ¼-inch rule.

Table 25. — Average annual mortality of growing stock and sawtimber on commercial forest land in Pennsylvania, by species, 1954-64

Species	Growing stock	Sawtimber
	Thousand cubic feet	*Thousand board feet*[1]
Softwoods:		
Yellow pines	1,732	2,458
White and red pines	502	796
Hemlock	1,466	1,772
Other softwoods	(2)	(2)
Total	3,700	5,026
Hardwoods:		
Select oak species	8,420	8,698
Other oaks	12,400	12,963
Hickory	970	2,180
Yellow birch	3,004	7
Sugar maple	2,553	2,814
Soft maples	3,757	(2)
Beech	1,524	1,488
Ash, walnut, and cherry	4,311	3,922
Yellow-poplar	1,059	2,128
Other hardwoods	24,773	13,318
Total	62,771	47,518
All species	66,471	52,544

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[1] International ¼-inch rule.
[2] Negligible.

Table 26a. — Average annual mortality of growing stock and sawtimber on commercial forest land in Pennsylvania, by ownership classes, and softwoods and hardwoods, 1954-64

Ownership	Growing stock (*thousand cubic feet*)			Sawtimber (*thousand board feet*)[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
National Forest	1,830	33	1,797	907	99	808
Other public	13,306	842	12,464	11,117	1,312	9,805
Forest industry	4,273	279	3,994	3,191	(2)	3,191
Farmer and misc. private	47,062	2,546	44,516	37,329	3,615	33,714
All ownerships	66,471	3,700	62,771	52,544	5,026	47,518

[1] International ¼-inch rule.
[2] Negligible.

Table 26b. — Average annual mortality of growing stock and sawtimber on commercial forest land in Pennsylvania, by causes and by softwoods and hardwoods, 1954-64

Cause of death	Growing stock (*thousand cubic feet*)			Sawtimber (*thousand board feet*)[1]		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
Fire	610	39	571	—	—	—
Insects	2,320	462	1,858	2,379	684	1,695
Diseases	30,918	514	30,404	19,285	1,213	18,072
Other	23,055	2,237	20,818	20,803	2,358	18,445
Unknown	9,568	448	9,120	10,077	771	9,306
All causes	66,471	3,700	62,771	52,544	5,026	47,518

[1] International ¼-inch rule.

Table 27.—Sampling errors for major breakdowns of average annual growth, cut, and mortality of growing stock and sawtimber in Pennsylvania, 1954-64

Table No.	Breakdown classification	Sampling error
		Percent
21.	Growth in cubic feet:	
	Softwoods	21
	Hardwoods	5
	All species	5
	Cut in cubic feet:	
	Softwoods	34
	Hardwoods	15
	All species	14
	Growth in board feet:	
	Softwoods	23
	Hardwoods	7
	All species	7
	Cut in board feet:	
	Softwoods	37
	Hardwoods	19
	All species	17
22.	Growth in cubic feet:	
	National Forest	4
	Other public	10
	Forest industry	25
	Farmer and misc. private	6
	Cut in cubic feet:	
	National Forest	30
	Other public	36
	Forest industry	45
	Farmer and misc. private	16
23.	Growth in board feet:	
	National Forest	9
	Other public	15
	Forest industry	29
	Farmer and misc. private	8
23.	Cut in board feet:	
	National Forest	46
	Other public	35
	Forest industry	48
	Farmer and misc. private	20

Table No.	Breakdown classification	Cubic feet	Board feet
		Percent	
25.	Mortality by species groups:		
	Softwoods	23	35
	Hardwoods	11	22
	All species	10	20
26.	Mortality by owner:		
	National Forest	17	56
	Other public	23	53
	Forest industry	37	60
	Farmer and misc. private	12	24
27.	Mortality by cause:		
	Fire	60	—
	Insect	33	77
	Disease	15	33
	Other	19	38
	Unknown	19	37

Table 28. — Total output of timber products, by products, by type of material used, and by softwoods and hardwoods, Pennsylvania 1964

Product and species group	Total output in standard units		Output from roundwood		Output from plant by-products (standard units)
	Unit	Number	Standard units	M cubic feet	
Sawlogs:					
Softwood	M board feet[1]	35,937	35,937	5,926	0
Hardwood	M board feet[1]	509,797	509,797	81,896	0
Total	M board feet[1]	545,734	545,734	87,822	0
Veneer logs:					
Softwood	M board feet	0	0	0	0
Hardwood	M board feet	18,079	18,079	2,907	0
Total	M board feet	18,079	18,079	2,907	0
Cooperage logs:					
Softwood	M board feet	0	0	0	0
Hardwood	M board feet	5,050	5,050	812	0
Total	M board feet	5,050	5,050	812	0
Pulpwood:					
Softwood	Standard cords[2]	90,600	89,500	7,160	1,100
Hardwood	Standard cords[2]	515,900	486,000	38,880	29,900
Total	Standard cords[2]	606,500	575,500	46,040	31,000
Piling:					
Softwood	M linear feet	0	0	0	0
Hardwood	M linear feet	0	0	0	0
Total	M linear feet	0	0	0	0
Poles:					
Softwood	M pieces	0	0	0	0
Hardwood	M pieces	0	0	0	0
Total	M pieces	0	0	0	0
Mine timbers (round):					
Softwood	M cubic feet	135	135	135	0
Hardwood	M cubic feet	3,634	3,634	3,634	0
Total	M cubic feet	3,769	3,769	3,769	0
Miscellaneous industrial wood:[3]					
Softwood	M cubic feet	52	0	0	52
Hardwood	M cubic feet	10,575	6,879	6,879	3,696
Total	M cubic feet	10,627	6,879	6,879	3,748

Continued

Table 28.—Continued

Product and species group	Total output in standard units		Output from roundwood		Output from plant by-products (standard units)
	Unit	Number	Standard units	M cubic feet	
Posts (round and split):					
Softwood	M pieces	0	0	0	0
Hardwood	M pieces	228	228	195	0
Total	M pieces	228	228	195	0
Fuelwood:					
Softwood	Standard cords	4,750	0	0	4,750
Hardwood	Standard cords	223,202	140,314	11,225	82,888
Total	Standard cords	227,952	140,314	11,225	87,638
All products:					
Softwood	M cubic feet	13,741	13,221	13,221	520
Hardwood	M cubic feet	159,147	146,428	146,428	12,719
Total	M cubic feet	172,888	159,649	159,649	13,239

[1] International ¼-inch rule.

[2] Rough wood basis (for example, chips converted to equivalent standard cords).

[3] Includes hewn ties, excelsior bolts, shingle bolts, turnery bolts, chemical wood, and the like.

Note: The lumber production total of 545,734,000 board feet is from the Pennsylvania Department of Forests and Waters' 100 percent canvass of the lumber industry.

Table 29. — Total output of roundwood products, by source and by softwoods and hardwoods, Pennsylvania, 1964

(In thousands of cubic feet)

Source	All species	Softwoods	Hardwoods
Growing-stock trees:[1]			
Sawtimber trees	125,993	6,579	119,414
Poletimber trees	27,589	5,151	22,438
Total	153,582	11,730	141,852
Cull trees[1]	1,280	38	1,242
Salvable dead trees[1]	142	0	142
Other sources[2]	4,645	1,453	3,192
All sources	159,649	13,221	146,428

[1] On commercial forest land.

[2] Includes noncommercial forest land, nonforest land such as fence rows, trees less than 5.0 inches in diameter, and tree tops and limbs.

Table 30. — Annual timber cut[1] from growing stock on commercial forest land, by products and logging residues, and by softwoods and hardwoods, Pennsylvania, 1964

(In thousands of cubic feet)

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	85,369	5,852	79,517
Veneer logs and bolts	2,860	0	2,860
Cooperage logs and bolts	799	0	799
Pulpwood	43,283	5,769	37,514
Piling	0	0	0
Poles	0	0	0
Mine timbers	3,615	109	3,506
Misc. industrial wood	6,637	0	6,637
Posts	188	0	188
Fuelwood	10,831	0	10,831
All products	153,582	11,730	141,852
Logging residues	48,618	1,190	47,428
Timber cut	202,200	12,920	189,280

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[1] Timber cut based on estimates of timber products output in 1964, by product.

Table 31. — Annual timber cut[1] from live sawtimber on commercial forest land, by products and logging residues, and by softwoods and hardwoods, Pennsylvania, 1964

(In thousands of board feet)[2]

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	390,886	28,340	362,546
Veneer logs and bolts	13,039	0	13,039
Cooperage logs and bolts	3,645	0	3,645
Pulpwood	109,535	2,570	106,965
Piling	0	0	0
Poles	0	0	0
Mine timbers	10,047	49	9,998
Misc. industrial wood	18,926	0	18,926
Posts	209	0	209
Fuelwood	30,885	0	30,885
All products	577,172	30,959	546,213
Logging residues	17,537	559	16,978
Timber cut	594,709	31,518	563,191

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[1] Timber cut based on estimates of timber products output in 1964, by product.

[2] International ¼-inch rule.

Table 32. — Volume of unused plant residues, by industrial source and type of residue, and by softwoods and hardwoods, Pennsylvania, 1964

(In thousands of cubic feet)

Species group and character of plant residues	Industrial source			
	Lumber industry	Veneer and plywood industry	Other primary industries	All industries
Softwoods:				
Coarse[1]	1,220	0	0	1,220
Fine[2]	571	0	0	571
Total	1,791	0	0	1,791
Hardwoods:				
Coarse	13,641	0	313	13,954
Fine	6,980	0	200	7,180
Total	20,621	0	513	21,134
All species:				
Coarse	14,861	0	313	15,174
Fine	7,551	0	200	7,751
Total	22,412	0	513	22,925

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[1] Unused material suitable for chipping, such as slabs, edgings, and veneer cores.

[2] Unused material not suitable for chipping, such as sawdust and shavings.

Table 33. — Timber growth projections for Pennsylvania, 1965[1]

Species group	1965 (inventory year)	1975	1985	1995
	GROWING STOCK *(Thousand cubic feet)*			
Softwoods:				
Cut	18,800	18,800	20,800	22,900
Growth	39,700	46,100	57,200	71,000
Inventory	1,477,200	1,710,100	2,031,000	2,456,900
Hardwoods:				
Cut	219,800	358,000	583,200	904,700
Growth	610,000	739,700	856,000	920,200
Inventory	16,382,900	20,291,300	23,622,500	24,937,500
Total:				
Cut	238,600	376,800	604,000	927,600
Growth	649,700	785,800	913,200	991,200
Inventory	17,860,100	22,001,400	25,653,500	27,394,400
	SAWTIMBER *(Thousand board feet)*[2]			
Softwoods:				
Cut	66,000	61,000	64,000	68,000
Growth	89,000	96,000	111,000	131,000
Inventory	3,268,000	3,559,000	3,969,000	4,519,000
Hardwoods:				
Cut	502,000	826,000	1,266,000	1,811,000
Growth	1,012,000	1,268,000	1,496,000	1,581,000
Inventory	23,000,000	27,668,000	31,123,000	31,124,000
Total:				
Cut	568,000	887,000	1,330,000	1,879,000
Growth	1,101,000	1,364,000	1,607,000	1,712,000
Inventory	26,268,000	31,227,000	35,092,000	35,643,000

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[1] Based upon the following assumptions: that timber output for the Nation and Pennsylvania will increase with gains in population, that the per capita consumption will increase slightly, and that forest management practices will continue to expand; that the cut of softwoods for 1964 will remain constant for the next 10 years and then increase each year from 1975 on; that the cut of hardwoods for 1964 will increase each year for the next 30 years.

[2] International ¼-inch rule.

Table 34. — Volume of growing stock on commercial forest land in Pennsylvania, by species and three kinds of ownership, 1965

(In millions of cubic feet)

Species	State Forests[1]	National Forest [2]	Other[3]	Total
Virginia pine	8.5	—	38.6	47.1
Other yellow pines	22.5	—	98.4	120.9
White pine	32.3	10.2	500.4	542.9
Hemlock	52.6	35.7	644.8	733.1
Spruce	—	.3	10.0	10.3
Other softwoods	1.9	—	20.7	22.6
Total softwoods	117.8	46.2	1,312.9	1,476.9
Select white oaks	157.8	31.5	1,266.2	1,455.5
Select red oaks	246.1	61.7	2,019.9	2,327.7
Other red oaks	123.9	3.7	1,075.7	1,203.3
Chestnut oak[4]	294.4	5.9	1,600.8	1,901.1
Hickory	9.4	.6	459.9	469.9
Yellow birch	42.8	17.3	124.9	185.0
Sugar maple	142.5	63.7	1,032.4	1,238.6
Soft maples	235.9	154.3	2,221.3	2,611.5
Beech	54.9	33.8	562.1	650.8
Blackgum[5]	3.0	.2	75.1	78.3
Ash	61.0	24.0	501.7	586.7
Aspen	70.1	13.3	399.3	482.7
Basswood	31.9	12.0	221.9	265.8
Yellow-poplar	8.8	7.1	485.1	501.0
Black walnut	—	—	35.8	35.8
Black cherry	164.9	168.7	1,119.9	1,453.5
Sycamore	—	—	34.4	34.4
Black locust	.2	—	87.3	87.5
Other hardwoods	91.5	22.9	700.2	814.6
Total hardwoods	1,739.1	620.7	14,023.9	16,383.7
All species	1,856.9	666.9	15,336.8	17,860.6

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[1] State Forests throughout the State were grouped into three geographic sampling units.

[2] National Forest was a separate geographic sampling unit.

[3] All other land in the State was divided into six geographic sampling units.

[4] Includes 11,300,000 cubic feet of other white oaks.

[5] Includes 2,300,000 cubic feet of sweetgum.

Table 35. — Volume of sawtimber on commercial forest land in Pennsylvania, by speices and three kinds of ownership, 1965

(In millions of board feet)[1]

Species	State Forests	National Forest	Other	Total
Virginia pine	—	—	54.0	54.0
Other yellow pines	75.0	—	206.0	281.0
White pine	128.6	25.5	1,189.3	1,343.4
Hemlock	131.3	101.5	1,332.8	1,565.6
Spruce	—	—	9.0	9.0
Other softwoods	4.7	—	10.3	15.0
Total softwoods	339.6	127.0	2,801.4	3,268.0
Select white oaks	172.0	41.3	2,005.8	2,219.1
Select red oaks	577.1	142.3	3,694.3	4,413.7
Other red oaks	232.6	5.2	1,997.4	2,235.2
Chestnut oak[2]	375.2	8.5	1,834.3	2,218.0
Hickory	18.4	.5	632.6	651.5
Yellow birch	21.6	15.0	117.3	153.9
Sugar maple	97.0	66.2	1,189.2	1,352.4
Soft maples	180.9	178.0	2,104.8	2,463.7
Beech	83.4	64.0	816.0	963.4
Blackgum[3]	3.4	—	84.6	88.0
Ash	138.5	47.5	699.4	885.4
Aspen	38.9	4.8	179.6	223.3
Basswood	67.4	14.8	305.6	387.8
Yellow-poplar	31.5	17.2	1,148.4	1,197.1
Black walnut	—	—	54.9	54.9
Black cherry	448.3	340.3	1,721.9	2,510.5
Sycamore	—	—	99.1	99.1
Black locust	.7	—	71.4	72.1
Other hardwoods	34.9	17.4	759.3	811.6
Total hardwoods	2,521.8	963.0	19,515.9	23,000.7
All species	2,861.4	1,090.0	22,317.3	26,268.7

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[1] International ¼-inch rule.

[2] Includes 20,400,000 board feet of other white oaks.

[3] Includes 2,200,000 board feet of sweetgum.

Table 36. — Area by land classes and geographic units in Pennsylvania, 1965

(In thousands of acres)

Land class	Geographic unit[1]								State total
	Western	South-western	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	
Forest land:									
Commercial	2,528	1,685	3,413	3,196	1,702	1,171	1,938	1,085	16,718
Productive-reserved	22	21	29	34	15	5	42	26	194
Unproductive	7	3	7	107	24	2	10	(2)	160
Total	2,557	1,709	3,449	3,337	1,741	1,178	1,990	1,111	17,072
Nonforest land	3,062	928	549	695	1,213	1,111	764	3,210	[3]11,732
Total area[4]	5,619	2,637	3,998	4,032	2,954	2,289	2,754	4,321	28,804
	Sampling errors, in percent								
Commercial forest	6.5	4.0	2.0	4.0	1.1	4.0	6.0	2.7	1.4

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[1] Geographic unit statistics include the Allegheny National Forest and State Forests that are within each unit's boundary.

[2] Negligible.

[3] Includes the 199,680 acres in Delaware and Philadelphia Counties that were not sampled.

[4] Source: 1964 Census of Agriculture.

Table 37. — Area of commercial forest land in Pennsylvania, by ownership classes and geographic units, 1965

(In thousands of acres)

Ownership class	Geographic unit								State total
	Western	South-western	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	
Public:									
National Forest	0	0	466	0	0	0	0	0	466
State Forests	4	69	629	547	311	10	69	56	1,695
Other public	67	166	247	228	121	102	226	66	1,223
Total	71	235	1,342	775	432	112	295	122	3,384
Private:									
Forest industry	10	25	395	108	28	24	3	17	610
Farmer-owned	893	537	347	355	509	397	248	359	3,645
Miscellaneous private	1,554	888	1,329	1,958	733	638	1,392	587	9,079
Total	2,457	1,450	2,071	2,421	1,270	1,059	1,643	963	13,334
All ownerships	2,528	1,685	3,413	3,196	1,702	1,171	1,938	1,085	16,718
	Sampling errors, in percent[1]								
Farmer-owned	16	14	16	18	8	17	19	14	6
Miscellaneous private	12	9	12	10	7	10	8	9	3

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[1] Public and forest-industry acreages were taken from records and therefore had no sampling errors.

Table 38. — Area of commercial forest land in Pennsylvania, by stand-size classes and geographic units, 1965

(In thousands of acres)

Stand-size class	Geographic unit								State total
	Western	South-western	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	
Sawtimber stands	1,242	860	1,424	1,292	932	431	507	644	7,332
Poletimber stands	437	475	1,449	1,264	614	513	774	291	5,817
Sapling-seedling stands	684	305	486	585	149	169	601	102	3,081
Nonstocked areas	165	45	54	55	7	58	56	48	488
All classes	2,528	1,685	3,413	3,196	1,702	1,171	1,938	1,085	16,718
	Sampling errors, in percent								
Sawtimber stands	12	9	11	12	5	15	13	8	3
Poletimber stands	20	13	12	13	9	13	11	18	4
Sapling-seedling stands	20	23	24	22	19	23	18	33	7
Nonstocked areas	*	48	45	45	**	43	44	49	28

* Sampling error of 50 to 100 percent.

** Sampling error of over 100 percent.

Table 39. — Area of sawtimber stands in Pennsylvania, by stocking-percent classes of growing-stock trees and geographic units, 1965

(In thousands of acres)

Sawtimber stands in geographic unit—	Stocking-percent class			All classes
	70 percent or more	40 to 70 percent	Under 40 percent	
Western	253	724	265	1,242
Southwestern	276	465	119	860
Allegheny	696	658	70	1,424
North-Central	484	663	145	1,292
South-Central	352	482	98	932
Northeastern	93	266	72	431
Pocono	265	195	47	507
Southeastern	214	365	65	644
All sawtimber stands	2,633	3,818	881	7,332

Table 40. — Area of commercial forest land in Pennsylvania, by forest types and geographic units, 1965

(In thousands of acres)

Forest type	Geographic unit								State total
	Western	South-western	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	
White pine	117	39	175	233	33	119	213	1	930
Virginia-pitch pine[1]	19	23	—	74	27	—	71	13	227
Oak-pine	—	11	22	—	59	—	33	10	135
Oak-hickory	704	929	674	1,923	1,372	274	1,046	749	7,671
Oak-gum	55	76	10	36	—	—	10	13	200
Elm-ash-red maple	580	155	460	255	88	196	193	145	2,072
Maple-beech-birch	476	362	1,599	380	116	400	83	129	3,545
Aspen-birch	577	90	473	295	7	182	289	25	1,938
All types	2,528	1,685	3,413	3,196	1,702	1,171	1,938	1,085	16,718
					Sampling errors, in percent				
White pine	37	49	32	29	38	35	29	**	12
Virginia-pitch pine	*	*	—	*	48	—	36	*	35
Oak-pine	—	**	16	—	31	—	*	**	21
Oak-hickory	15	8	9	6	3	11	8	6	3
Oak-gum	*	*	**	*	—	—	**	*	38
Elm-ash-red maple	17	23	13	18	25	21	21	26	7
Maple-beech-birch	18	15	5	15	21	14	29	27	5
Aspen-birch	27	33	20	25	**	32	25	*	11

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[1] Includes 19,000 acres of the spruce forest type in the Pocono unit.

* Sampling error of 50 to 100 percent.

** Sampling error of over 100 percent.

Table 41. — Area of commercial forest land in the WESTERN geographic unit, Pennsylvania, by forest types and stand-size classes, 1965

(In thousands of acres)

Forest type[1]	Stand-size class: Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	All classes
White pine[2]	104.5	12.9	18.4	—	135.8
Oak-hickory	479.9	81.0	124.8	18.4	704.1
Oak-gum	18.4	—	36.9	—	55.3
Elm-ash-red maple	355.9	100.1	124.1	—	580.1
Maple-beech-birch	230.4	135.3	91.7	18.4	475.8
Aspen-birch	52.9	107.6	288.4	127.5	576.4
All types	1,242.0	436.9	684.3	164.3	2,527.5

[1] Whenever the acreage for a forest type is less than 1 percent of the unit total, a further breakdown into stand-size classes is not shown.

[2] Includes 18,400 acres of the Virginia-pitch pine forest type.

Table 42. — Area of commercial forest land in the SOUTHWESTERN geographic unit, Pennsylvania, by forest types and stand-size classes, 1965

(In thousands of acres)

Forest type	Stand-size class: Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	All classes
White pine	38.7	0.6	0.1	—	39.4
Virginia-pitch pine	—	11.3	11.3	—	22.6
Oak-hickory	518.0	323.7	75.8	11.3	928.8
Oak-gum[1]	—	11.3	76.4	—	87.7
Elm-ash-red maple	90.6	55.9	8.1	—	154.6
Maple-beech-birch	212.7	72.1	65.4	11.3	361.5
Aspen-birch	—	—	67.7	22.6	90.3
All types	860.0	474.9	304.8	45.2	1,684.9

[1] Includes 11,300 acres of the oak-pine forest type.

Table 43. — Area of commercial forest land in the ALLEGHENY geographic unit, Pennsylvania, by forest types and stand-size classes, 1965

(In thousands of acres)

Forest type	Stand-size class				All classes
	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	
White pine	115.2	44.9	14.6	—	174.7
Oak-pine[1]	17.0	12.7	2.7	—	32.4
Oak-hickory	276.9	324.6	69.9	2.6	674.0
Elm-ash-red maple	238.0	188.5	33.2	—	459.7
Maple-beech-birch	756.4	730.5	82.2	29.8	1,598.9
Aspen-birch	20.4	148.0	283.2	21.5	473.1
All types	1,423.9	1,449.2	485.8	53.9	3,412.8

[1] Includes 9,900 acres of the oak-gum forest type.

Table 44. — Area of commercial forest land in the NORTH-CENTRAL geographic unit, Pennsylvania, by forest types and stand-size classes, 1965

(In thousands of acres)

Forest type	Stand-size class				All classes
	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	
White pine	154.7	53.7	24.2	—	232.6
Virginia-pitch pine	—	60.6	14.2	—	74.8
Oak-hickory	796.3	878.5	236.7	11.6	1,923.1
Oak-gum	9.5	14.7	11.6	—	35.8
Elm-ash-red maple	133.8	95.6	25.4	—	254.8
Maple-beech-birch	184.5	143.1	33.6	18.8	380.0
Aspen-birch	13.1	18.0	239.5	24.5	295.1
All types	1,291.9	1,264.2	585.2	54.9	3,196.2

Table 45. — Area of commercial forest land in the SOUTH-CENTRAL geographic unit, Pennsylvania, by forest types and stand-size classes, 1965

(In thousands of acres)

Forest type	Stand-size class				All classes
	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	
White pine	22.7	2.8	7.5	—	33.0
Virginia-pitch pine	—	19.5	7.2	—	26.7
Oak-pine	20.1	24.1	14.4	—	58.6
Oak-hickory	795.4	490.0	79.5	7.2	1,372.1
Elm-ash-red maple[1]	34.9	33.2	27.4	—	95.5
Maple-beech-birch	59.2	43.9	13.5	—	116.6
All types	932.3	613.5	149.5	7.2	1,702.5

[1] Includes 7,200 acres of the aspen-birch type.

Table 46. — Area of commercial forest land in the NORTHEASTERN geographic unit, Pennsylvania, by forest types and stand-size classes, 1965

(In thousands of acres)

Forest type	Stand-size class				All classes
	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	
White pine	76.9	38.4	3.8	—	119.1
Oak-hickory	58.3	154.7	47.7	13.0	273.7
Elm-ash-red maple	51.7	128.3	11.9	4.3	196.2
Maple-beech-birch	238.2	141.7	11.7	8.4	400.0
Aspen-birch	5.8	50.2	93.3	32.3	181.6
All types	430.9	513.3	168.4	58.0	1,170.6

Table 47. — Area of commercial forest land in the POCONO geographic unit, Pennsylvania, by forest types and stand-size classes, 1965

(In thousands of acres)

Forest type	Stand-size class				All classes
	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	
White pine	138.4	57.7	16.8	—	212.9
Virginia-pitch pine[1]	7.4	36.4	27.3	—	71.1
Oak-pine[2]	25.6	—	7.4	10.2	43.2
Oak-hickory	223.9	514.6	285.2	22.4	1,046.1
Elm-ash-red maple	51.3	99.7	37.5	4.2	192.7
Maple-beech-birch	51.8	22.5	7.5	1.8	83.6
Aspen-birch	9.3	42.9	219.8	17.1	289.1
All types	507.7	773.8	601.5	55.7	1,938.7

[1] Includes 18,800 acres of the spruce forest type.

[2] Includes 10,200 acres of the oak-gum forest type.

Table 48. — Area of commercial forest land in the SOUTHEASTERN geographic unit, Pennsylvania, by forest types and stand-size classes, 1965

(In thousands of acres)

Forest type	Stand-size class				All classes
	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Nonstocked areas	
Virginia-pitch pine[1]	13.0	0.4	0.2	—	13.6
Oak-hickory	539.6	161.7	37.6	10.0	748.9
Oak-gum[2]	10.0	—	—	12.8	22.8
Elm-ash-red maple	71.0	61.2	—	12.8	145.0
Maple-beech-birch	10.0	67.6	51.2	—	128.8
Aspen-birch	—	—	12.8	12.8	25.6
All types	643.6	290.9	101.8	48.4	1,084.7

[1] Includes 800 acres of the white pine forest type.

[2] Includes 10,000 acres of the oak-pine forest type.

Table 47.—Volume of timber on commercial forest land in Pennsylvania by class of timber and geographic units, 1965

(In millions of cubic feet)

Class of timber	Geographic unit								State total
	Western	South-western	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	
Sawtimber trees:									
Sawlogs	897	703	1,648	1,078	891	323	488	647	6,675
Upper stems	178	145	356	232	188	68	104	126	1,397
Total	1,075	848	2,004	1,310	1,079	391	592	773	8,072
Poletimber trees	1,064	850	2,749	1,865	938	745	1,086	491	9,788
All growing stock	2,139	1,698	4,753	3,175	2,017	1,136	1.678	1,264	17,860
Rough trees:									
Sawtimber size	158	88	233	156	80	77	56	73	921
Poletimber size	101	52	150	101	58	72	52	51	637
Total	259	140	383	257	138	149	108	124	1,558
Rotten trees:									
Sawtimber size	57	61	92	62	57	28	20	22	399
Poletimber size	22	26	45	31	19	19	13	11	186
Total	79	87	137	93	76	47	33	33	585
Total, all timber	2,477	1,925	5,273	3,525	2,231	1,332	1,819	1,421	20,003
	Sampling errors, in percent								
Sawtimber trees	7	6	4	5	4	9	8	6	2.1
Poletimber trees	11	6	3	4	4	7	6	8	1.8
All growing stock	5	4	3	4	3	6	5	4	1.3
Rough trees	13	10	8	7	8	11	12	11	3.9
Rotten trees	12	10	9	10	9	13	15	15	3.8

Table 50. — Volume of growing stock on commercial forest land in Pennsylvania, by ownership classes, softwoods and hardwoods, and geographic units, 1965

(In millions of cubic feet)

Ownership and species group	Geographic unit								State total
	Western	South-western	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	
State Forests:									
Softwoods	—	5	32	35	33	1	7	5	118
Hardwoods	3	58	813	506	265	10	46	38	1,739
Total	3	63	845	541	298	11	53	43	1,857
Other public[1]:									
Softwoods	1	7	63	17	5	4	6	2	105
Hardwoods	88	181	984	363	144	85	117	84	2,046
Total	89	188	1,047	380	149	89	123	86	2,151
Private:									
Softwoods	162	42	200	272	122	126	289	41	1,254
Hardwoods	1,885	1,405	2,661	1,982	1,448	910	1,213	1,094	12,598
Total	2,047	1,447	2,861	2,254	1,570	1,036	1,502	1,135	13,852
All ownerships:									
Softwoods	163	54	295	324	160	131	302	48	1,477
Hardwoods	1,976	1,644	4,458	2,851	1,857	1,005	1,376	1,216	16,383
Total	2,139	1,698	4,753	3,175	2,017	1,136	1,678	1,264	17,860
	Sampling errors, in percent								
Total line only, for:									
State forests	10	10	4	5	6	30	16	16	3
Other public	41	21	12	16	21	41	24	40	10
Private	6	4	4	5	4	4	5	5	2

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[1] Includes 46 and 621 million cubic feet for softwoods and hardwoods respectively on National Forest land in the Allegheny geographic unit

ership classes, softwoods and hardwoods, and geographic units, 1965
(In millions of board feet)

Ownership and species group	Geographic unit								State total
	Western	South-western	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	
State Forests:									
Softwoods	1	15	64	124	110	2	12	12	340
Hardwoods	4	77	1,114	731	472	14	54	56	2,522
Total	5	92	1,178	855	582	16	66	68	2,862
Other public[1]:									
Softwoods	2	18	166	40	13	7	25	4	275
Hardwoods	183	277	1,401	438	246	76	91	151	2,863
Total	185	295	1,567	478	259	83	116	155	3,138
Private:									
Softwoods	192	59	462	589	275	219	760	97	2,653
Hardwoods	2,996	2,181	3,493	2,581	2,229	1,079	1,251	1,806	17,616
Total	3,188	2,240	3,955	3,170	2,504	1,298	2,011	1,903	20,269
All ownerships:									
Softwoods	195	92	692	753	398	228	797	113	3,268
Hardwoods	3,183	2,535	6,008	3,750	2,947	1,169	1,396	2,013	23,001
Total	3,378	2,627	6,700	4,503	3,345	1,397	2,193	2,126	26,269
	Sampling errors, in percent								
Total line only, for:									
State Forests	28	21	10	13	13	49	28	29	7
Other public	45	25	9	18	24	38	32	41	8
Private	7	7	6	7	6	9	8	8	3

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[1] Includes 127 and 963 million board feet for softwoods and hardwoods respectively on National Forest land in the Allegheny geographic unit.

Table 52. — Volume of growing stock on commercial forest land in Pennsylvania, by stand-size classes, softwoods and hardwoods, and geographic units, 1965

(In millions of cubic feet)

Stand-size class and species group	Geographic unit								State total
	Western	South-western	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	
Sawtimber stands:									
Softwoods	153	43	199	218	96	95	217	43	1,064
Hardwoods	1,527	1,195	2,573	1,647	1,375	475	592	973	10,357
Total	1,680	1,238	2,772	1,865	1,471	570	809	1,016	11,421
Poletimber stands:									
Softwoods	7	6	88	97	57	32	75	5	367
Hardwoods	331	396	1,829	1,079	463	512	730	223	5,563
Total	338	402	1,917	1,176	520	544	805	228	5,930
Other stands:									
Softwoods	3	5	8	9	7	4	10	—	46
Hardwoods	118	53	56	125	19	18	54	20	463
Total	121	58	64	134	26	22	64	20	509
All stands:									
Softwoods	163	54	295	324	160	131	302	48	1,477
Hardwoods	1,976	1,644	4,458	2,851	1,857	1,005	1,376	1,216	16,383
Total	2,139	1,698	4,753	3,175	2,017	1,136	1,678	1,264	17,860
	Sampling errors, in percent								
Total line only, for:									
Sawtimber stands	6	6	4	5	4	13	11	6	2
Poletimber stands	20	14	5	8	9	14	11	21	4
Other stands	28	28	27	20	26	36	24	*	11
All stands:									
Softwoods	48	36	7	7	11	48	34	30	9
Hardwoods	6	4	3	4	3	6	5	5	1
Total	5	4	3	4	3	6	5	4	1

* Sampling error is more than 50 percent.

Table 53. — Volume of sawtimber on commercial forest land in Pennsylvania, by stand-size classes, softwoods and hardwoods, and geographic units, 1965
(In millions of board feet)

Stand-size class and species group	Geographic unit								State total
	Western	South-western	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	
Sawtimber stands:									
Softwoods	186	80	557	606	276	183	637	104	2,629
Hardwoods	2,932	2,246	4,793	3,126	2,622	895	1,045	1,862	19,521
Total	3,118	2,326	5,350	3,732	2,898	1,078	1,682	1,966	22,150
Poletimber stands:									
Softwoods	9	6	122	132	113	40	141	9	572
Hardwoods	151	244	1,156	480	301	255	306	123	3,016
Total	160	250	1,278	612	414	295	447	132	3,588
Other stands:									
Softwoods	—	6	13	15	9	5	19	—	67
Hardwoods	100	45	59	144	24	19	45	28	464
Total	100	51	72	159	33	24	64	28	531
All stands:									
Softwoods	195	92	692	753	398	228	797	113	3,268
Hardwoods	3,183	2,535	6,008	3,750	2,947	1,169	1,396	2,013	23,001
Total	3,378	2,627	6,700	4,503	3,345	1,397	2,193	2,126	26,269
	Sampling errors, in percent								
Total line only, for:									
Sawtimber stands	6	6	4	5	4	11	9	7	2
Poletimber stands	27	20	10	12	13	20	18	29	6
Other stands	44	48	45	25	36	48	40	49	15
All stands:									
Softwoods	36	30	12	12	13	30	20	34	8
Hardwoods	6	6	3	4	5	14	11	7	2
Total	6	6	3	4	4	10	7	6	2

Table 54.—Growing-stock volume on state forests and the National forest in Pennsylvania, by species and geographic units, 1965

(In millions of cubic feet)

Species	State Forests in geographic units—								National Forest
	South-western[1]	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	All units	Alle-gheny
Yellow pines[2]	1.8	3.9	10.6	9.1	—	4.1	3.4	32.9	0.3
White pine	1.5	7.7	10.2	10.2	0.3	1.3	1.1	32.3	10.2
Hemlock	1.6	20.1	14.3	13.5	.4	1.7	1.0	52.6	35.7
Total softwoods	4.9	31.7	35.1	32.8	.7	7.1	5.5	117.8	46.2
Select white oaks	9.2	26.0	65.7	38.3	.7	10.0	7.9	157.8	31.5
Select red oaks	9.9	86.9	84.9	51.5	1.2	5.8	5.9	246.1	61.7
Other red oaks	8.7	15.0	63.5	27.6	.2	3.9	5.0	123.9	3.7
Chestnut oak	15.7	35.1	108.2	104.4	.9	14.7	15.4	294.4	5.9
Hickory	.4	.9	3.2	3.7	—	.6	.6	9.4	.6
Yellow birch	1.5	25.8	11.7	3.0	.2	.4	.2	42.8	17.3
Sugar maple	1.3	117.3	20.0	.5	1.7	1.6	.1	142.5	63.7
Soft maples	6.7	150.4	57.0	14.6	2.0	3.8	1.4	235.9	154.3
Beech	.4	43.7	8.6	.3	.9	1.0	—	54.9	33.8
Ash	.5	44.7	12.7	1.1	.9	.9	.2	61.0	24.0
Aspen	.7	56.6	11.4	.7	.4	.3	—	70.1	13.3
Basswood	.8	21.5	8.5	.7	.2	.1	.1	31.9	12.0
Yellow-poplar	.3	1.5	2.5	3.6	—	.3	.6	8.8	7.1
Black cherry	1.7	139.0	22.4	.6	.8	.4	—	164.9	168.7
Other hardwoods[3]	3.5	48.8	25.4	14.2	.4	1.4	1.0	94.7	23.1
Total hardwoods	61.3	813.2	505.7	264.8	10.5	45.2	38.4	1,739.1	620.7
All species	66.2	844.9	540.8	297.6	11.2	52.3	43.9	1,856.9	666.9

[1] Includes 3,100,000 cubic feet in the western geographic unit.

[2] Includes 2,200,000 cubic feet of other softwoods.

Table 55. — Sawtimber volume on state forests and the National forest in Pennsylvania, by species and geographic units, 1965

(In millions of board feet)

Species	State Forests in geographic units—								National Forest
	South-western[1]	Alle-gheny	North-Central	South-Central	North-eastern	Pocono	South-eastern	All units	Alle-gheny
Yellow pines[2]	4.6	11.8	36.5	20.8	0.1	2.0	3.9	79.7	—
White pine	7.0	22.5	43.7	44.8	.6	5.2	4.8	128.6	25.5
Hemlock	4.5	30.0	43.1	44.1	.9	5.3	3.4	131.3	101.5
Total softwoods	16.1	64.3	123.3	109.7	1.6	12.5	12.1	339.6	127.0
Select white oaks	8.7	28.0	66.3	55.8	.5	5.9	6.8	172.0	41.3
Select red oaks	22.3	190.6	205.9	132.0	2.3	10.0	14.0	577.1	142.3
Other red oaks	15.5	24.7	106.1	69.7	.3	5.2	11.1	232.6	5.2
Chestnut oak	18.9	25.4	137.9	155.4	1.1	18.7	17.8	375.2	8.5
Hickory	.7	1.8	6.0	8.1	—	.7	1.1	18.4	.5
Yellow birch	1.4	7.4	7.8	4.0	.1	.6	.3	21.6	15.0
Sugar maple	1.4	70.9	19.0	.4	2.7	2.6	—	97.0	66.2
Soft maples	4.2	116.7	39.2	14.9	1.7	3.1	1.1	180.9	178.0
Beech	—	66.9	11.7	.9	1.9	1.9	.1	83.4	64.0
Ash	.7	100.7	31.4	2.2	1.5	1.5	.5	138.5	47.5
Aspen	.1	34.6	3.6	.1	.2	.3	—	38.9	4.8
Basswood	1.3	44.8	17.9	2.3	.4	.4	.3	67.4	14.8
Yellow-poplar	.9	7.0	8.3	12.3	—	.9	2.1	31.5	17.2
Black cherry	2.8	384.1	59.0	.3	1.3	.8	—	448.3	340.3
Other hardwoods[3]	1.6	9.9	11.7	13.5	.1	1.0	1.2	39.0	17.4
Total hardwoods	80.5	1.113.5	731.8	471.9	14.1	53.6	56.4	2,521.8	963.0
All species	96.6	1,117.8	855.1	581.6	15.7	66.1	68.5	2,861.4	1,090.0

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[1] Includes 4,600,000 board feet in the western unit.

[2] Includes 4,700,000 board feet of other softwoods.

[3] Includes 3,400,000 board feet of blackgum.

Table 56. — Growing-stock volume on commercial forest land in the WESTERN unit, by species and diameter classes, 1965

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White pine[1]	90.5	33.4	40.3	9.6	2.5	0.9	2.6	—	—	1.2
Hemlock	72.2	19.4	13.9	11.2	8.4	7.0	4.5	5.4	2.4	—
Total softwoods	162.7	52.8	54.2	20.8	10.9	7.9	7.1	5.4	2.4	1.2
Select white oaks	140.5	7.5	12.8	19.1	8.4	17.7	20.4	9.6	33.0	12.0
Select red oaks	235.8	17.2	39.7	39.4	28.9	23.6	23.8	21.4	36.0	5.8
Other red oaks	134.1	6.9	8.3	9.6	23.6	10.2	10.3	7.7	49.0	8.5
Chestnut oak	31.2	2.2	3.3	8.4	1.5	.8	3.0	4.6	6.4	1.0
Hickory	112.0	14.0	18.1	22.5	24.1	10.7	11.9	5.6	5.1	—
Yellow birch	34.7	6.5	6.7	3.1	7.7	9.8	.9	—	—	—
Sugar maple	148.3	19.2	28.2	18.4	20.9	17.4	18.0	8.4	17.8	—
Soft maples	275.1	67.3	65.3	54.6	27.9	15.9	15.9	7.6	18.8	1.8
Beech	79.6	14.4	7.7	8.3	13.6	7.6	15.3	2.0	10.7	—
Ash	82.0	16.6	17.5	13.0	15.7	5.5	6.3	.6	6.8	—
Aspen	89.0	29.4	32.9	20.3	3.5	1.2	1.7	—	—	—
Yellow-poplar	90.5	7.2	14.4	8.3	20.2	15.0	11.9	7.8	5.7	—
Black cherry	253.9	29.0	52.0	59.8	33.5	28.7	23.2	15.3	11.7	.7
Black locust	23.4	6.3	4.7	6.6	3.3	.9	.8	.8	—	—
Other hardwoods[2]	246.1	32.5	41.2	36.2	36.5	33.7	28.1	20.8	15.0	2.1
Total hardwoods	1,976.2	276.2	352.8	327.6	269.3	198.7	191.5	112.2	216.0	31.9
All species	2,138.9	329.0	407.0	348.4	280.2	206.6	198.6	117.6	218.4	33.1

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[1] Includes 200,000 cubic feet of yellow pines.

[2] Includes 17,300,000 cubic feet of black walnut.

Table 57. — Sawtimber volume on commercial forest land in the WESTERN unit, by species and diameter classes, 1965

(In millions of board feet)

Species	All classes	Diameter class (inches at breast height)						
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
White pine[1]	59.5	31.8	8.9	3.2	9.3	—	—	6.3
Hemlock	135.3	36.1	30.0	24.7	16.6	19.1	8.8	—
Total softwoods	194.8	67.9	38.9	27.9	25.9	19.1	8.8	6.3
Select white oaks	323.6	—	23.3	54.6	59.2	28.6	106.9	51.0
Select red oaks	448.5	—	81.4	75.0	75.6	68.5	123.9	24.1
Other red oaks	349.8	—	66.7	30.0	32.6	25.7	163.9	30.9
Chestnut oak	53.1	—	3.7	2.1	8.7	13.3	20.7	4.6
Hickory	178.2	—	72.4	30.3	40.3	19.2	16.0	—
Yellow birch	58.8	—	22.8	33.5	2.5	—	—	—
Sugar maple	262.4	—	59.4	59.0	54.9	27.4	61.7	—
Soft maples	278.5	—	85.1	51.8	49.0	25.9	60.8	5.9
Beech	154.9	—	38.7	25.2	49.2	5.8	36.0	—
Ash	108.9	—	44.7	18.2	19.1	2.4	24.5	—
Aspen	19.1	—	11.0	3.3	4.8	—	—	—
Yellow-poplar	178.5	—	56.3	44.7	36.2	24.4	16.9	—
Black cherry	336.1	—	88.4	84.9	70.2	48.9	40.4	3.3
Black locust	18.5	—	9.8	2.6	2.9	3.2	—	—
Other hardwoods[2]	414.2	—	105.1	101.2	84.9	64.0	52.1	6.9
Total hardwoods	3,183.1	—	768.8	616.4	590.1	357.3	723.8	126.7
All species	3,377.9	67.9	807.7	644.3	616.0	376.4	732.6	133.0

[1] Includes 400,000 board feet of yellow pines.
[2] Includes 24,400,000 board feet of black walnut.

Table 58. — Growing-stock volume on commercial forest land in the SOUTHWESTERN unit, by species and diameter classes, 1965

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)							
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines	13.0	3.2	3.1	3.5	2.0	0.4	0.1	0.7	—	—
White pine	21.4	5.7	6.7	5.1	1.0	1.2	.9	.1	0.7	—
Hemlock	19.9	4.8	4.0	1.5	2.2	1.8	3.4	1.8	.4	—
Total softwoods	54.3	13.7	13.8	10.1	5.2	3.4	4.4	2.6	1.1	—
Select white oaks	100.6	11.6	17.0	14.0	15.2	11.2	13.3	1.8	13.9	2.6
Select red oaks	361.9	36.2	43.3	50.5	48.3	47.3	36.4	26.2	60.7	13.0
Other red oaks	90.4	7.8	8.6	16.6	15.5	17.0	8.3	5.6	10.0	1.0
Chestnut oak	250.4	44.8	42.9	52.7	35.6	28.4	18.2	15.3	12.5	—
Hickory	48.9	9.8	8.9	8.7	5.8	5.9	3.3	4.4	2.1	—
Sugar maple	120.3	23.0	22.1	20.7	16.3	7.2	6.9	3.7	15.0	5.4
Soft maples	181.1	48.2	41.1	38.2	15.1	10.1	10.4	4.1	13.9	—
Beech	27.4	4.3	6.7	4.6	3.1	3.1	2.6	1.2	1.8	—
Ash	33.3	7.5	1.4	5.3	1.7	7.3	4.4	3.8	1.9	—
Yellow-poplar	78.0	3.1	9.1	11.7	16.0	10.9	10.0	4.2	11.9	1.1
Black cherry	205.0	26.5	28.5	49.9	39.6	20.7	18.1	9.5	9.6	2.6
Other hardwoods[1]	146.7	35.4	27.8	34.1	15.6	14.3	5.3	5.1	6.0	3.1
Total hardwoods	1,644.0	258.2	257.4	307.0	227.8	183.4	137.2	84.9	159.3	28.8
All species	1,698.3	271.9	271.2	317.1	233.0	186.8	141.6	87.5	160.4	28.8

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[1] Includes 1,800,000 cubic feet of black walnut.

Table 59. — Sawtimber volume on commercial forest land in the SOUTHWESTERN unit, by species and diameter classes, 1965

(In millions of board feet)

Species	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines	22.3	10.9	7.3	1.1	0.3	2.7	—	—
White pine	31.2	15.0	3.4	4.4	3.8	.5	4.1	—
Hemlock	38.9	4.6	7.6	6.2	12.5	6.8	1.2	—
Total softwoods	92.4	30.5	18.3	11.7	16.6	10.0	5.3	—
Select white oaks	184.0	—	45.1	35.2	39.4	7.4	46.5	10.4
Select red oaks	728.5	—	135.6	137.7	113.0	84.4	209.3	48.5
Other red oaks	177.8	—	47.6	51.3	26.9	16.5	32.3	3.2
Chestnut oak	329.7	—	98.6	83.7	58.5	47.1	41.8	—
Hickory	66.1	—	15.5	17.4	11.4	13.7	8.1	—
Sugar maple	170.1	—	46.0	22.1	20.5	11.8	52.4	17.3
Soft maples	178.3	—	43.6	31.8	32.3	14.9	55.7	—
Beech	34.6	—	8.4	9.3	7.3	4.1	5.5	—
Ash	56.7	—	4.5	20.6	13.5	11.4	6.7	—
Yellow-poplar	168.6	—	45.7	33.1	32.2	13.4	40.7	3.5
Black cherry	289.8	—	108.1	59.8	53.3	28.9	33.1	6.6
Other hardwoods[1]	150.6	—	43.6	40.8	16.3	15.0	25.0	9.9
Total hardwoods	2,534.8	—	642.3	542.8	424.6	268.6	557.1	99.4
All species	2,627.2	30.5	660.6	554.5	441.2	278.6	562.4	99.4

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[1] Includes 3,400,000 board feet of black walnut.

Table 60. — Growing-stock volume on commercial forest land in the ALLEGHENY unit, by species and diameter classes, 1965

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)							
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines	6.6	0.9	2.6	1.2	1.2	0.2	0.3	0.2	—	—
White pine	77.3	7.1	12.8	10.9	7.5	8.4	7.9	5.1	15.6	2.0
Hemlock	210.7	45.4	40.7	32.9	28.9	21.6	14.5	8.2	18.4	.1
Total softwoods	294.6	53.4	56.1	45.0	37.6	30.2	22.7	13.5	34.0	2.1
Select white oaks	243.9	42.9	46.6	44.4	36.3	25.8	19.0	10.0	18.3	.6
Select red oaks	471.4	44.9	67.3	78.1	80.7	57.8	44.2	37.5	60.1	.8
Other red oaks	97.5	11.5	18.0	17.1	16.0	14.0	9.0	5.5	6.4	—
Chestnut oak	110.5	28.2	24.4	18.2	16.7	12.4	5.1	3.3	2.2	—
Yellow birch	91.4	23.9	28.8	21.5	9.3	3.8	3.1	.5	.5	—
Sugar maple	685.8	144.8	187.9	162.6	78.0	49.6	25.3	15.0	22.4	.2
Soft maples	971.8	220.2	235.6	216.9	152.5	77.1	36.9	16.4	15.3	.9
Beech	323.6	59.2	56.8	62.4	36.9	42.0	26.4	15.3	24.6	—
Ash	231.5	21.3	36.9	57.4	46.5	37.5	14.5	10.9	6.5	—
Aspen	168.7	42.8	59.2	43.4	17.8	5.0	.5	—	—	—
Basswood	123.8	10.6	29.2	36.6	22.1	10.9	7.7	2.7	4.0	—
Black cherry	711.1	46.2	99.8	137.5	138.4	117.6	74.1	46.1	51.0	.4
Other hardwoods	227.6	53.1	51.6	51.7	25.7	21.3	13.4	5.8	4.3	.7
Total hardwoods	4,458.6	749.6	942.1	947.8	676.9	474.8	279.2	169.0	215.6	3.6
All species	4,753.2	803.0	998.2	992.8	714.5	505.0	301.9	182.5	249.6	5.7

Table 61. — Sawtimber volume on commercial forest land in the ALLEGHENY unit, by species and diameter classes, 1965

(In millions of board feet)

Species	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines	17.1	5.5	7.1	1.7	1.7	1.1	—	—
White pine	203.4	29.2	22.0	29.2	30.0	19.2	66.6	7.2
Hemlock	471.3	108.1	102.1	87.4	61.9	33.0	78.5	.3
Total softwoods	691.8	142.8	131.2	118.3	93.6	53.3	145.1	7.5
Select white oaks	372.4	—	113.1	81.6	70.2	37.9	67.5	2.1
Select red oaks	979.4	—	250.7	195.8	157.0	141.3	230.6	4.0
Other red oaks	165.0	—	44.8	42.4	33.6	20.6	23.5	.1
Chestnut oak	73.7	—	25.2	22.2	12.9	8.3	5.0	.1
Yellow birch	44.5	—	23.0	10.0	8.6	1.0	1.9	—
Sugar maple	607.2	—	226.2	160.2	81.8	52.6	85.4	1.0
Soft maples	955.8	—	462.1	248.8	126.0	61.9	53.2	3.8
Beech	454.2	—	101.2	128.7	86.4	50.1	87.7	.1
Ash	403.2	—	147.5	127.0	58.7	46.5	23.5	—
Aspen	90.5	—	70.9	17.4	2.2	—	—	—
Basswood	153.2	—	67.4	34.0	23.7	8.8	19.3	—
Black cherry	1,481.2	—	446.7	404.0	277.2	160.6	191.0	1.7
Other hardwoods	227.8	—	71.5	66.8	45.7	24.7	17.0	2.1
Total hardwoods	6,008.1	—	2,050.3	1,538.9	984.0	614.3	805.6	15.0
All species	6,699.9	142.8	2,181.5	1,657.2	1,077.6	667.6	950.7	22.5

Table 62. — Growing-stock volume on commercial forest land in the NORTH-CENTRAL unit, by species and diameter classes, 1965

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)							
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines[1]	51.3	8.9	21.9	8.3	7.5	1.9	1.8	1.0	—	—
White pine	87.1	8.1	14.5	12.2	8.4	9.5	8.8	5.8	17.6	2.2
Hemlock	186.3	40.1	36.0	29.1	25.5	19.1	12.8	7.3	16.4	—
Total softwoods	324.7	57.1	72.4	49.6	41.4	30.5	23.4	14.1	34.0	2.2
Select white oaks	414.0	72.8	87.7	82.6	53.0	36.4	32.3	17.1	31.1	1.0
Select red oaks	546.0	52.0	84.7	97.3	86.8	60.0	51.1	43.4	69.7	1.0
Other red oaks	264.6	31.4	56.6	52.6	35.5	31.5	24.4	15.1	17.5	—
Chestnut oak	432.5	110.3	116.4	85.2	44.3	34.8	20.1	12.7	8.6	.1
Hickory	39.9	4.6	7.2	14.6	6.5	3.9	1.5	.1	1.5	—
Sugar maple	76.5	16.2	21.8	18.8	7.8	4.9	2.8	1.7	2.5	—
Soft maples	483.9	109.7	124.2	113.9	69.2	32.5	18.3	8.1	7.6	.4
Beech	62.5	11.4	11.6	12.5	6.6	7.6	5.1	3.0	4.7	—
Ash	48.2	4.4	8.1	12.4	9.3	7.3	3.0	2.3	1.4	—
Aspen	85.0	21.6	31.7	23.0	7.1	1.3	.3	—	—	—
Basswood	42.6	3.6	10.6	13.2	7.1	3.2	2.6	.9	1.4	—
Black cherry	148.3	9.6	21.8	29.9	27.9	23.3	15.5	9.6	10.6	.1
Other hardwoods	206.2	49.5	52.7	47.3	17.9	15.6	13.0	6.1	3.5	.6
Total hardwoods	2,850.2	497.1	635.1	603.3	379.0	262.3	190.0	120.1	160.1	3.2
All species	3,174.9	554.2	707.5	652.9	420.4	292.8	213.4	134.2	194.1	5.4

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[1] Includes 11,600,000 cubic feet of other softwoods.

Table 63. — Sawtimber volume on commercial forest land in the NORTH-CENTRAL unit, by species and diameter classes, 1965

(In millions of board feet)

Species	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines[1]	72.6	24.9	29.3	7.0	6.9	4.4	0.1	—
White pine	289.5	41.5	31.3	41.5	42.7	27.4	94.8	10.3
Hemlock	391.1	89.7	84.8	72.5	51.3	27.4	65.2	.2
Total softwoods	753.2	156.1	145.4	121.0	100.9	59.2	160.1	10.5
Select white oaks	546.8	—	166.1	119.7	103.0	55.7	99.2	3.1
Select red oaks	1,052.2	—	269.4	210.3	168.6	151.8	247.8	4.3
Other red oaks	451.6	—	122.6	116.2	91.9	56.5	64.3	.1
Chestnut oak	451.3	—	154.5	136.1	79.0	50.7	30.7	.3
Hickory	38.1	—	16.5	12.9	4.3	.2	4.2	—
Sugar maple	63.4	—	23.6	16.7	8.6	5.5	8.9	.1
Soft maples	444.5	—	214.9	115.7	58.6	28.7	24.8	1.8
Beech	102.6	—	22.9	29.1	19.5	11.3	19.8	—
Ash	61.0	—	22.4	19.2	8.9	7.0	3.5	—
Aspen	22.0	—	17.3	4.2	.5	—	—	—
Basswood	68.7	—	30.1	15.3	10.7	3.9	8.7	—
Black cherry	243.9	—	73.6	66.5	45.6	26.4	31.5	.3
Other hardwoods	203.9	—	64.7	56.9	43.4	23.3	13.6	2.0
Total hardwoods	3,750.0	—	1.198.6	918.8	642.6	421.0	557.0	12.0
All species	4,503.2	156.1	1,344.0	1,039.8	743.5	480.2	717.1	22.5

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[1] Includes 3,200,000 board feet of other softwoods.

Table 64. — Growing-stock volume on commercial forest land in the SOUTH-CENTRAL unit, by species and diameter classes, 1965

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)							
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Virginia pine	23.6	5.2	7.4	4.7	3.6	2.7	—	—	—	—
Other yellow pines[1]	30.8	5.6	7.0	6.1	6.5	2.8	2.7	0.1	—	—
White pine	71.9	6.2	8.3	11.8	9.7	7.5	12.1	4.5	11.8	—
Hemlock	33.8	6.8	4.2	6.0	3.6	6.7	3.1	1.7	1.7	—
Total softwoods	160.1	23.8	26.9	28.6	23.4	19.7	17.9	6.3	13.5	—
Select white oaks	234.6	25.5	33.4	42.5	45.2	27.2	22.5	12.7	24.3	1.3
Select red oaks	271.1	21.2	41.7	44.5	46.8	36.5	30.4	19.7	28.0	2.3
Other red oaks	286.5	24.1	37.0	58.5	51.1	49.4	30.8	15.8	19.6	.2
Chestnut oak	552.9	61.3	105.1	109.9	92.3	84.0	52.9	25.0	21.7	.7
Hickory	105.1	14.9	19.1	24.3	15.2	10.6	9.6	5.0	6.4	—
Sugar maple	21.7	6.0	5.5	3.6	3.3	2.1	.5	.2	.5	—
Soft maples	108.9	24.9	22.2	19.6	15.9	14.3	6.5	2.2	2.6	.7
Ash	46.7	6.1	4.0	7.3	8.0	6.6	3.7	4.1	6.9	—
Yellow-poplar	50.4	3.0	5.2	8.0	7.4	8.8	5.8	6.6	5.6	—
Black locust	26.4	3.2	6.7	7.5	3.6	2.9	.9	1.6	—	—
Other hardwoods[2]	152.8	31.6	28.3	31.2	21.5	12.3	9.8	5.1	13.0	—
Total hardwoods	1,857.1	221.8	308.2	356.9	310.3	254.7	173.4	98.0	128.6	5.2
All species	2,017.2	245.6	335.1	385.5	333.7	274.4	191.3	104.3	142.1	5.2

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[1] Includes 9,200,000 cubic feet of other softwoods.

[2] Includes 11,100,000 cubic feet of black cherry and 8,400,000 cubic feet of black walnut.

Table 65. — Sawtimber volume on commercial forest land in the SOUTH-CENTRAL unit, by species and diameter classes, 1965

(In millions of board feet)

Species	All classes	Diameter class (inches at breast height)						
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Virginia pine	34.3	14.0	11.4	8.9	—	—	—	—
Other yellow pines[1]	61.1	18.3	21.5	10.3	10.2	0.8	—	—
White pine	216.5	35.5	31.1	26.4	45.6	19.5	58.4	—
Hemlock	86.2	19.9	13.1	27.0	12.4	5.2	8.5	0.1
Total softwoods	398.1	87.7	77.1	72.6	68.2	25.5	66.9	.1
Select white oaks	404.4	—	132.2	81.7	67.8	37.2	81.1	4.4
Select red oaks	524.8	—	135.6	118.0	98.2	68.5	96.8	7.7
Other red oaks	500.8	—	146.1	146.3	93.7	48.8	65.3	.6
Chestnut oak	823.3	—	258.8	248.8	162.3	80.9	68.8	3.7
Hickory	139.3	—	42.1	31.8	28.1	14.8	22.5	—
Sugar maple	19.5	—	9.2	5.8	1.4	1.0	2.1	—
Soft maples	126.2	—	46.3	42.7	18.5	7.0	8.6	3.1
Ash	83.5	—	21.2	17.3	10.9	13.2	20.9	—
Yellow-poplar	114.3	—	23.1	24.7	19.4	25.0	22.1	—
Black locust	27.6	—	10.2	9.6	2.8	5.0	—	—
Other hardwoods[2]	182.8	—	58.7	36.2	29.4	16.6	41.9	—
Total hardwoods	2,946.5	—	883.5	762.9	532.5	318.0	430.1	19.5
All species	3,344.6	87.7	960.6	835.5	600.7	343.5	497.0	19.6

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[1] Includes 9,400,000 board feet of other softwoods.

[2] Includes 2,500,000 board feet of black cherry and 12,800,000 board feet of black walnut.

Table 66. — Growing-stock volume on commercial forest land in the NORTHEASTERN unit, by species and diameter classes, 1965

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)							
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Spruce[1]	4.9	1.1	1.2	0.7	0.8	0.8	0.1	0.2	—	—
White pine	32.5	3.2	8.8	3.4	3.3	4.8	3.9	1.0	4.0	0.1
Hemlock	93.5	20.4	23.9	20.6	11.8	6.9	2.7	4.3	2.9	—
Total softwoods	130.9	24.7	33.9	24.7	15.9	12.5	6.7	5.5	6.9	.1
Select white oaks	33.5	7.3	9.1	7.4	4.5	2.5	.8	.7	1.2	—
Select red oaks	112.1	18.6	27.0	22.4	15.5	14.0	5.5	3.8	4.2	1.1
Other red oaks	13.4	2.0	3.9	2.3	2.0	2.1	.7	.1	.3	—
Chestnut oak	66.0	16.6	17.8	16.0	7.6	3.7	2.2	1.5	.6	—
Hickory	19.3	4.9	3.9	4.7	3.0	1.0	.8	.2	.8	—
Yellow birch	16.2	5.9	5.3	1.4	2.2	1.4	—	—	—	—
Sugar maple	149.2	31.0	36.4	31.0	19.9	12.9	8.0	3.1	4.5	2.4
Soft maples	223.4	65.7	57.3	50.7	23.6	12.2	5.6	4.4	3.9	—
Beech	90.7	13.0	17.0	24.6	18.6	8.6	3.4	4.4	1.1	—
Ash	56.2	8.9	13.4	13.1	9.5	4.3	2.7	3.2	.8	.3
Aspen	66.7	12.4	22.4	18.6	8.0	4.9	.4	—	—	—
Basswood	34.1	3.8	5.5	6.1	7.4	6.2	3.1	.7	1.3	—
Black cherry	77.7	12.5	20.4	12.9	16.4	9.0	2.3	1.9	2.3	—
Other hardwoods	47.1	13.3	12.0	7.9	4.7	3.8	2.0	.6	1.2	1.6
Total hardwoods	1,005.6	215.9	251.4	219.1	142.9	86.6	37.5	24.6	22.2	5.4
All species	1,136.5	240.6	285.3	243.8	158.8	99.1	44.2	30.1	29.1	5.5

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[1] Includes 400,000 cubic feet of yellow pines.

Table 67. — Sawtimber volume on commercial forest land in NORTHEASTERN unit, by species and diameter classes, 1965

(In millions of board feet)

Species	All classes	Diameter class (inches at breast height)						
		9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Spruce[1]	5.7	1.3	1.8	1.8	0.3	0.5	—	—
White pine	63.9	8.5	8.9	15.5	13.4	3.4	13.6	0.6
Hemlock	158.9	60.4	37.7	24.5	10.7	14.7	10.9	—
Total softwoods	228.5	70.2	48.4	41.8	24.4	18.6	24.5	.6
Select white oaks	30.5	—	13.5	7.7	2.5	2.7	4.1	—
Select red oaks	193.4	—	63.3	59.7	25.8	18.6	20.6	5.4
Other red oaks	14.1	—	5.1	6.1	1.9	.3	.7	—
Chestnut oak	79.6	—	37.4	19.2	11.6	8.1	3.3	—
Hickory	25.2	—	12.7	4.3	4.0	.8	3.4	—
Yellow birch	13.0	—	7.9	5.1	—	—	—	—
Sugar maple	192.8	—	69.4	48.8	30.4	14.6	18.6	11.0
Soft maples	188.2	—	84.4	46.9	22.0	18.4	16.5	—
Beech	126.3	—	58.7	32.4	12.3	18.3	4.6	—
Ash	73.8	—	29.8	18.2	8.9	13.1	2.3	1.5
Aspen	24.4	—	15.2	8.1	1.1	—	—	—
Basswood	63.5	—	23.4	21.6	9.9	2.3	6.3	—
Black cherry	106.1	—	50.2	30.4	8.3	7.5	9.7	—
Other hardwoods	38.0	—	11.3	9.1	5.7	1.7	3.9	6.3
Total hardwoods	1,168.9	—	482.3	317.6	144.4	106.4	94.0	24.2
All species	1,397.4	70.2	530.7	359.4	168.8	125.0	118.5	24.8

[1] Includes 100,000 board feet of yellow pine.

Table 68. — Growing-stock volume on commercial forest land in the POCONO unit, by species and diameter classes, 1965

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)							
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines[1]	51.3	11.9	12.6	7.1	8.5	7.9	1.4	1.9	—	—
White pine	144.5	14.2	38.5	15.3	14.7	21.2	17.4	4.6	17.9	0.7
Hemlock	106.1	23.1	27.2	23.4	13.4	7.8	3.1	4.9	3.2	—
Total softwoods	301.9	49.2	78.3	45.8	36.6	36.9	21.9	11.4	21.1	.7
Select white oaks	198.0	43.5	53.5	43.9	26.7	14.7	4.4	4.5	6.8	—
Select red oaks	168.8	28.1	40.2	33.8	23.7	21.0	8.4	5.8	6.2	1.6
Other red oaks	73.6	11.0	21.9	12.5	10.7	11.7	3.6	.7	1.5	—
Chestnut oak	286.0	71.7	77.3	69.2	33.2	16.0	9.4	6.5	2.7	—
Hickory	37.5	9.5	7.5	9.1	5.9	1.8	1.7	.3	1.7	—
Sugar maple	31.1	6.4	7.4	6.5	4.3	2.7	1.7	.7	.9	.5
Soft maples	285.6	84.0	72.8	64.8	30.7	15.5	7.1	5.7	5.0	—
Beech	46.1	6.6	8.7	12.3	9.4	4.4	1.8	2.3	.6	—
Ash	32.6	5.2	7.8	7.6	5.5	2.5	1.5	1.8	.5	.2
Aspen	55.3	10.2	18.4	15.4	6.8	4.1	.4	—	—	—
Yellow-poplar	32.3	2.1	.6	.1	7.4	16.6	4.6	.1	.8	—
Black cherry	35.9	5.8	9.4	6.0	7.5	4.2	1.1	.9	1.0	—
Other hardwoods	92.6	26.7	25.1	15.9	10.0	5.6	3.7	.9	2.0	2.7
Total hardwoods	1,375.4	310.8	350.6	297.1	181.8	120.8	49.4	30.2	29.7	5.0
All species	1,677.3	360.0	428.9	342.9	218.4	157.7	71.3	41.6	50.8	5.7

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[1] Includes 7,000,000 cubic feet of spruce and other softwoods.

Table 69. — Sawtimber volume on commercial forest land in the POCONO unit, by species and diameter classes, 1965

(In millions of board feet)

Species	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines[1]	109.8	25.7	34.2	34.7	6.3	8.9	—	—
White pine	423.8	56.0	59.1	103.6	88.5	22.4	90.2	4.0
Hemlock	262.5	99.7	62.4	40.5	17.6	24.4	17.9	—
Total softwoods	796.1	181.4	155.7	178.8	112.4	55.7	108.1	4.0
Select white oaks	198.5	—	87.7	50.4	16.2	17.8	26.4	—
Select red oaks	197.9	—	64.7	61.1	26.3	19.1	21.1	5.6
Other red oaks	103.1	—	36.8	45.0	13.9	2.2	5.2	—
Chestnut oak	188.4	—	88.4	45.5	27.4	19.3	7.8	—
Hickory	32.9	—	16.4	5.7	5.2	1.0	4.6	—
Sugar maple	31.7	—	11.4	8.0	5.0	2.4	3.1	1.8
Soft maples	211.4	—	94.7	52.7	24.8	20.7	18.5	—
Beech	66.6	—	30.8	17.1	6.5	9.7	2.5	—
Ash	41.5	—	16.7	10.2	5.0	7.4	1.3	.9
Aspen	58.6	—	36.4	19.6	2.6	—	—	—
Yellow-poplar	125.1	—	28.2	73.4	20.0	.7	2.8	—
Black cherry	45.3	—	21.4	13.0	3.5	3.2	4.2	—
Other hardwoods	95.6	—	33.9	19.2	13.1	5.5	11.1	12.8
Total hardwoods	1,396.6	—	567.5	420.9	169.5	109.0	108.6	21.1
All species	2,192.7	181.4	723.2	599.7	281.9	164.7	216.7	25.1

[1] Includes 4,800,000 board feet of spruce and other softwoods.

Table 70.—Growing-stock volume on commercial forest land in the SOUTHEASTERN unit, by species and diameter classes, 1965

(In millions of cubic feet)

Species	All classes	Diameter class (inches at breast height)							
		5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines[1]	19.2	1.9	5.3	3.1	6.7	1.6	0.6	—	—	—
White pine	17.9	.5	.8	1.4	2.5	3.0	1.9	4.9	2.9	—
Hemlock	10.6	1.4	2.7	1.0	1.9	1.7	1.7	.1	.1	—
Total softwoods	47.7	3.8	8.8	5.5	11.1	6.3	4.2	5.0	3.0	—
Select white oaks	90.4	7.5	18.1	7.7	14.6	8.4	7.2	7.1	16.9	2.9
Select red oaks	160.6	10.9	20.0	23.4	21.7	19.8	22.6	22.3	19.9	—
Other red oaks	243.2	16.4	23.2	31.0	28.1	38.5	34.3	25.9	44.0	1.8
Chestnut oak[2]	171.6	21.8	33.2	36.4	27.9	15.0	12.5	8.5	14.2	2.1
Hickory	85.1	9.2	12.1	11.0	21.0	13.8	5.4	3.0	7.3	2.3
Soft maples	81.7	19.7	12.6	18.5	11.2	6.5	6.1	6.0	1.1	—
Blackgum	20.0	1.5	2.6	5.1	6.7	2.1	1.0	.5	.5	—
Ash	56.2	10.9	11.4	11.0	9.1	9.0	2.0	.1	2.7	—
Yellow-poplar	180.1	3.9	6.8	11.8	16.5	38.2	24.6	27.6	40.3	10.4
Other hardwoods[3]	127.7	27.5	29.6	23.4	18.8	11.3	6.1	3.4	7.6	—
Total hardwoods	1,216.6	129.3	169.6	179.3	175.6	162.6	121.8	104.4	154.5	19.5
All species	1,264.3	133.1	178.4	184.8	186.7	168.9	126.0	109.4	157.5	19.5

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[1] Includes 200,000 cubic feet of other softwoods.

[2] Includes 8,800,000 cubic feet of other white oaks.

[3] Includes 7,700,000 cubic feet of black walnut.

Table 71. — Sawtimber volume on commercial forest land in the SOUTHEASTERN unit, by species and diameter classes, 1965

(In millions of board feet)

Species	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-28.9	29.0 and larger
Yellow pines[1]	35.7	8.3	19.4	5.5	2.5	—	—	—
White pine	56.0	4.3	8.6	9.5	5.9	16.7	11.0	—
Hemlock	21.4	3.0	6.0	5.6	6.1	.3	.4	—
Total softwoods	113.1	15.6	34.0	20.6	14.5	17.0	11.4	—
Select white oaks	158.9	—	37.6	23.0	19.3	20.2	48.7	10.1
Select red oaks	289.0	—	52.6	54.3	63.5	60.6	57.8	.2
Other red oaks	473.0	—	73.0	104.1	92.5	71.1	126.3	6.0
Chestnut oak[2]	218.9	—	68.6	39.8	37.0	24.2	41.2	8.1
Hickory	139.3	—	53.8	37.1	14.3	7.9	19.6	6.6
Soft maples	80.8	—	28.3	17.0	17.1	15.2	3.2	—
Blackgum	26.6	—	16.5	5.3	2.5	1.0	1.3	—
Ash	56.8	—	20.7	22.9	5.3	.3	7.6	—
Yellow-poplar	443.0	—	40.0	106.0	66.4	79.4	130.3	20.9
Other hardwoods[3]	126.4	—	43.4	30.5	15.7	14.4	22.4	—
Total hardwoods	2,012.7	—	434.5	440.0	333.6	294.3	458.4	51.9
All species	2,125.8	15.6	468.5	460.6	348.1	311.3	469.8	51.9

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[1] Includes 700,000 board feet of other softwoods.
[2] Includes 16,700,000 board feet of other white oaks.
[3] Includes 12,600,000 board feet of black walnut.

Table 72. — Sawtimber volume on commercial forest land in the WESTERN unit, by species and quality classes, 1965

(In millions of board feet)

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Other[1]
Softwoods:					
White pine[2]	59.5	1.9	0.9	36.3	20.4
Hemlock	135.3	—	—	—	135.3
Total softwoods	194.8	1.9	.9	36.3	155.7
Hardwoods:					
Select white oaks	323.6	45.4	77.9	129.8	70.5
Select red oaks	448.5	62.8	108.0	180.0	97.7
Other red oaks	349.8	60.4	77.3	111.0	101.1
Chestnut oak[3]	53.1	9.1	11.6	17.1	15.3
Hickory	178.2	2.0	26.2	93.3	56.7
Yellow birch	58.8	.9	7.1	47.2	3.6
Sugar maple	262.4	22.9	49.1	131.4	59.0
Soft maples	278.5	6.1	44.8	163.3	64.3
Beech	154.9	1.1	2.8	102.1	48.9
Ash	108.9	4.2	28.4	55.2	21.1
Basswood	38.8	1.9	5.7	23.2	8.0
Yellow-poplar	178.5	18.2	30.0	75.0	55.3
Black cherry	336.1	16.5	70.9	179.5	69.2
Other hardwoods	413.0	19.0	60.7	248.2	85.1
Total hardwoods	3,183.1	270.5	600.5	1,556.3	755.8
Hardwood quality (in percent)	100	8	19	49	24

[1] For softwoods, only pines were graded into standard-lumber logs, and pine in this column is Grade 4. Other softwoods had only one classification, that of merchantable. For hardwoods, the volumes in this column are for tie-and-timber logs.

[2] Includes 400,000 board feet of yellow pines.

[3] Includes a small volume of other white oaks.

Table 73. — Sawtimber volume on commercial forest land in the SOUTHWESTERN unit, by species and quality classes, 1965

(In millions of board feet)

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Other[1]
Softwoods:					
Yellow pines	22.0	0.3	0.7	10.5	10.5
White pine	31.2	1.6	2.4	10.9	16.3
Hemlock[2]	39.2	—	—	—	39.2
Total softwoods	92.4	1.9	3.1	21.4	66.0
Hardwoods:					
Select white oaks	184.0	21.3	45.5	72.8	44.4
Select red oaks	728.5	85.1	181.2	286.9	175.3
Other red oaks	177.8	9.2	32.0	85.2	51.4
Chestnut oak[3]	329.7	17.3	61.4	159.2	91.8
Hickory	66.1	5.0	8.9	31.4	20.8
Sugar maple	170.1	18.7	26.6	87.6	37.2
Soft maples	178.3	14.4	31.9	96.8	35.2
Beech	34.6	1.4	4.6	14.5	14.1
Ash	56.7	4.9	16.8	26.1	8.9
Yellow-poplar	168.6	23.8	35.1	59.8	49.9
Black cherry	289.8	9.2	42.0	172.0	66.6
Other hardwoods	150.6	13.2	24.9	91.2	21.3
Total hardwoods	2,534.8	223.5	510.9	1,183.5	616.9
Hardwood quality (in percent)	100	9	20	47	24

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[1] See footnote of table 72.

[2] Includes a small amount of other softwoods.

[3] Includes a small amount of other white oaks.

Table 74. — Sawtimber volume on commercial forest land in the ALLEGHENY unit, by species and quality classes, 1965

(In millions of board feet)

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Other[1]
Softwoods:					
Yellow pines	17.1	0.7	3.5	5.4	7.5
White pine	203.4	17.2	26.8	83.1	76.3
Hemlock	471.3	—	—	—	471.3
Total softwoods	691.8	17.9	30.3	88.5	555.1
Hardwoods:					
Select white oaks	372.4	56.0	86.1	160.9	69.4
Select red oaks	979.4	155.2	227.4	428.9	167.9
Other red oaks	165.0	9.4	27.8	75.2	52.6
Chestnut oak[2]	73.7	4.9	13.3	35.1	20.4
Yellow birch	44.5	1.1	6.1	32.6	4.7
Sugar maple	607.2	53.2	103.5	303.6	146.9
Soft maples	955.8	30.9	165.1	505.1	254.7
Beech	454.2	31.1	69.3	244.7	109.1
Ash	403.2	42.0	92.9	201.9	66.4
Aspen	90.5	2.7	11.2	64.6	12.0
Basswood	153.2	8.2	35.3	91.8	17.9
Yellow-poplar	82.2	22.1	19.9	30.2	10.0
Black cherry	1,481.2	192.9	307.6	746.0	234.7
Other hardwoods	145.6	5.9	25.0	83.5	31.2
Total hardwoods	6,008.1	615.6	1,190.5	3,004.1	1,197.9
Hardwood quality (in percent)	100	10	20	50	20

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[1] See footnote of table 72.

[2] Includes a small volume of other white oaks.

Table 75. — Sawtimber volume on commercial forest land in the NORTH-CENTRAL unit, by species and quality classes, 1965

(In millions of board feet)

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Other[1]
Softwoods:					
Yellow pines	69.4	2.9	14.1	21.7	30.7
White pine	289.5	24.5	38.2	118.2	108.6
Hemlock[2]	394.3	—	—	—	394.3
Total softwoods	753.2	27.4	52.3	139.9	533.6
Hardwoods:					
Select white oaks	546.8	82.1	126.4	236.3	102.0
Select red oaks	1,052.2	166.8	244.4	460.7	180.3
Other red oaks	451.6	25.6	76.1	205.9	144.0
Chestnut oak	451.3	29.9	81.6	215.1	124.7
Hickory	38.1	1.6	4.8	18.4	13.3
Sugar maple	63.4	5.5	10.8	31.7	15.4
Soft maples	444.5	14.3	76.8	235.0	118.4
Beech	102.6	7.0	15.6	55.4	24.6
Ash	61.0	6.3	14.0	30.7	10.0
Basswood	68.7	3.7	15.9	41.1	8.0
Yellow-poplar	76.8	20.7	18.6	28.1	9.4
Black cherry	243.9	31.8	50.6	122.9	38.6
Other hardwoods	149.1	5.5	25.2	94.6	23.8
Total hardwoods	3,750.0	400.8	760.8	1,775.9	812.5
Hardwood quality (in percent)	100	11	20	47	22

[1] See footnote of table 72.

[2] Includes 3,200,000 board feet of other softwoods.

Table 76. — Sawtimber volume on commercial forest land in the SOUTH-CENTRAL unit, by species and quality classes, 1965

(In millions of board feet)

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Other[1]
Softwoods:					
Yellow pines	86.0	1.4	6.9	51.1	26.6
White pine	216.5	17.4	29.3	82.3	87.5
Hemlock[2]	95.6	—	—	—	95.6
Total softwoods	398.1	18.8	36.2	133.4	209.7
Hardwoods:					
Select white oaks	404.4	35.2	86.4	189.7	93.1
Select red oaks	524.8	52.0	113.1	250.1	109.6
Other red oaks	500.8	27.0	71.9	248.1	153.8
Chestnut oak	823.3	49.3	125.4	416.6	232.0
Hickory	139.3	12.9	19.7	62.2	44.5
Soft maples	126.2	4.0	14.5	82.0	25.7
Ash	83.5	4.5	15.6	46.9	16.5
Yellow-poplar	114.3	22.8	24.0	40.1	27.4
Black locust	27.6	.8	3.2	18.7	4.9
Other hardwoods	202.3	6.4	25.0	130.1	40.8
Total hardwoods	2,946.5	214.9	498.8	1,484.5	748.3
Hardwood quality (in percent)	100	7	17	51	25

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[1] See footnote of table 72.

[2] Includes 9,400,000 board feet of other softwoods.

Table 77.—Sawtimber volume on commercial forest land in the NORTHEASTERN unit, by species and quality classes, 1965

(In millions of board feet)

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Other[1]
Softwoods:					
Spruce	5.7	—	—	—	5.7
White pine	63.9	0.9	8.7	29.8	24.5
Hemlock	158.9	—	—	—	158.9
Total softwoods	228.5	.9	8.7	29.8	189.1
Hardwoods:					
Select white oaks	30.5	2.1	5.3	16.4	6.7
Select red oaks	193.4	13.8	33.9	103.5	42.2
Other red oaks	14.1	.2	1.8	7.2	4.9
Chestnut oak	79.6	1.5	10.5	40.5	27.1
Hickory	25.2	1.5	2.2	12.6	8.9
Yellow birch	13.0	.2	2.6	8.6	1.6
Sugar maple	192.8	15.7	40.4	85.9	50.8
Soft maples	188.2	2.3	28.3	111.8	45.8
Beech	126.3	3.1	16.2	67.8	39.2
Ash	73.8	3.6	23.1	33.0	14.1
Aspen	24.4	1.4	2.9	16.1	4.0
Basswood	63.5	3.6	7.6	41.9	10.4
Black cherry	106.1	3.9	19.6	54.8	27.8
Other hardwoods	38.0	2.5	4.1	25.2	6.2
Total hardwoods	1,168.9	55.4	198.5	625.3	289.7
Hardwood quality (in percent)	100	5	17	53	25

[1] See footnote of table 72.

Table 78. — Sawtimber volume on commercial forest land in the POCONO unit, by species and quality classes, 1965
(In millions of board feet)

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Other[1]
Softwoods:					
Yellow pines	94.6	1.4	4.1	52.4	36.7
White pine	423.8	6.3	58.0	196.8	162.7
Hemlock[2]	277.7	—	—	—	277.7
Total softwoods	796.1	7.7	62.1	249.2	477.1
Hardwoods:					
Select white oaks	198.5	14.0	34.6	106.2	43.7
Select red oaks	197.9	14.2	34.6	106.0	43.1
Other red oaks	103.1	1.7	13.2	52.0	36.2
Chestnut oak	188.4	3.6	24.8	95.9	64.1
Hickory	32.9	2.0	2.9	16.4	11.6
Sugar maple	31.7	2.6	6.7	14.0	8.4
Soft maples	211.4	2.5	31.7	125.8	51.4
Beech	66.6	1.7	8.6	35.7	20.6
Ash	41.5	2.1	13.0	18.5	7.9
Aspen	58.6	3.3	6.8	38.9	9.6
Basswood	22.1	1.3	2.6	14.6	3.6
Yellow-poplar	125.1	11.1	8.5	86.5	19.0
Black cherry	45.3	1.6	8.3	23.6	11.8
Other hardwoods	73.5	3.8	9.3	48.5	11.9
Total hardwoods	1,396.6	65.5	205.6	782.6	342.9
Hardwood quality (in percent)	100	5	15	56	24

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[1] See footnote of table 72.

[2] Includes 4,800,000 board feet of spruce and other softwoods.

Table 79. — Sawtimber volume on commercial forest land in the SOUTHEASTERN unit, by species and quality classes, 1965

(In millions of board feet)

Species	All classes	Standard-lumber logs			
		Grade 1	Grade 2	Grade 3	Other[1]
Softwoods:					
Yellow pines	35.0	0.2	4.5	16.2	14.1
White pine	56.0	5.3	7.9	25.7	17.1
Hemlock[2]	22.1	—	—	—	22.1
Total softwoods	113.1	5.5	12.4	41.9	53.3
Hardwoods:					
Select white oaks	158.9	9.7	35.4	69.6	44.2
Select red oaks	289.0	18.2	64.5	126.9	79.4
Other red oaks	473.0	24.3	95.2	185.9	167.6
Chestnut oak[3]	218.9	12.0	43.7	88.1	75.1
Hickory	139.3	1.7	15.9	72.3	49.4
Soft maples	80.8	2.2	11.4	52.5	14.7
Blackgum	26.6	—	3.6	20.6	2.4
Ash	56.8	2.2	9.1	34.2	11.3
Yellow-poplar	443.0	70.9	112.4	168.1	91.6
Other hardwoods	126.4	—	14.2	88.7	23.5
Total hardwoods	2,012.7	141.2	405.4	906.9	559.2
Hardwood quality (in percent)	100	7	20	45	28

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[1] See footnote of table 72.

[2] Includes 700,000 board feet of other softwoods.

[3] Includes 16,700,000 board feet of other white oaks.

Table 80. — Average net annual growth of growing stock on commercial forest land in Pennsylvania, by species and geographic units, 1954-64

(In millions of cubic feet)

Species	Geographic unit						State total
	Western	South-western	North-Central[1]	South-Central	North-eastern[2]	South-eastern	
Yellow pines	—	0.4	0.9	2.3	1.5	0.5	5.6
White pine	2.5	.8	3.6	1.5	6.0	.4	14.8
Hemlock	3.2	.5	11.3	.8	4.6	.2	20.6
Other softwoods	—	—	.2	.3	.3	—	.8
Total softwoods	5.7	1.7	16.0	4.9	12.4	1.1	41.8
Select oak species	11.0	22.1	50.9	14.4	15.2	8.8	122.4
Other oak species	6.6	10.8	25.9	30.1	15.2	19.0	107.6
Hickory	4.5	2.3	2.5	3.0	1.7	2.5	16.5
Yellow birch	.7	.2	3.3	.1	.5	—	4.8
Sugar maple	5.9	5.8	32.2	.9	6.3	.2	51.3
Soft maples	10.9	8.6	61.4	4.4	14.5	2.4	102.2
Beech	2.1	.9	13.2	.2	3.2	.4	20.0
Ash, walnut, cherry	12.4	7.7	47.3	2.8	5.1	2.6	77.9
Yellow-poplar	2.4	2.5	2.2	1.4	1.3	5.3	15.1
Other hardwoods	9.0	4.5	25.8	6.2	6.6	3.3	55.4
Total hardwoods	65.5	65.4	264.7	63.5	69.6	44.5	573.2
All species	71.2	67.1	280.7	68.4	82.0	45.6	615.0
			Sampling errors, in percent				
Total softwoods	*	*	37	*	38	**	20
Total hardwoods	16	13	9	13	12	12	4
All species	15	12	8	12	11	12	4

* Sampling error of 51 to 100 percent.

** More than 100 percent sampling error.

[1] Includes the Allegheny and North-Central subunits.

Average annual cut of growing stock on commercial forest land in Pennsylvania, by species and geographic units, 1954-64

(In millions of cubic feet)

Species	Geographic unit						State total
	Western	South-western	North-Central[1]	South-Central	North-eastern[2]	South-eastern	
Yellow pines	—	0.1	0.6	1.2	0.1	—	2.0
White pine	1.8	—	.3	3.8	—	—	5.9
Hemlock	2.9	—	3.6	—	5.7	—	12.2
Other softwoods	—	—	.9	—	—	—	.9
Total softwoods	4.7	.1	5.4	5.0	5.8	—	21.0
Select oak species	5.3	2.8	15.1	2.6	6.4	12.7	44.9
Other oak species	3.6	.9	4.5	9.7	8.4	4.6	31.7
Hickory	—	1.3	2.6	.2	—	—	4.1
Yellow birch	.7	—	1.1	—	1.3	—	3.1
Sugar maple	.7	1.1	5.5	—	1.2	—	8.5
Soft maples	5.8	1.9	9.4	3.2	5.2	—	25.5
Beech	.9	—	8.1	—	1.6	—	10.6
Ash, walnut, cherry	2.6	12.4	13.0	1.3	1.6	.7	31.6
Yellow-poplar	.7	—	.4	—	—	3.7	4.8
Other hardwoods	2.7	3.5	10.7	.3	.7	.3	18.2
Total hardwoods	23.0	23.9	70.4	17.3	26.4	22.0	183.0
All species	27.7	24.0	75.8	22.3	32.2	22.0	204.0
	Sampling errors, in percent						
Total softwoods	**	**	*	*	*	—	34
Total hardwoods	33	46	29	45	33	39	15
All species	33	46	28	37	31	39	14

* Sampling error of 51 to 100 percent.

** More than 100 percent sampling error.

[1] Includes the Allegheny and North-Central subunits.

[2] Includes the Pocono and Northeastern subunits.

Table 82. — Average net annual growth of sawtimber on commercial forest land in Pennsylvania, by species and geographic units, 1954-64
(In millions of board feet)

Species	Geographic unit						State total
	Western	South-western	North-Central[1]	South-Central	North-eastern[2]	South-eastern	
Yellow pines	—	0.6	1.4	3.2	3.3	0.8	9.3
White pine	2.0	1.2	12.2	6.7	14.6	1.3	38.0
Hemlock	5.8	1.5	28.5	2.3	9.0	.5	47.6
Other softwoods	—	—	.1	.2	.3	—	.6
Total softwoods	7.8	3.3	42.2	12.4	27.2	2.6	95.5
Select oak species	37.4	43.8	103.1	31.6	22.0	18.2	256.1
Other oak species	21.1	17.2	37.5	42.9	15.1	26.3	160.1
Hickory	6.7	3.4	2.3	3.8	1.6	3.8	21.6
Yellow birch	1.7	.2	2.0	.1	.8	—	4.8
Sugar maple	10.0	8.7	31.7	.8	9.0	.1	60.3
Soft maples	14.6	7.8	66.3	3.4	10.7	2.2	105.0
Beech	5.9	1.1	19.1	.3	5.2	.5	32.1
Ash, walnut, cherry	24.5	12.0	102.6	2.7	10.8	2.1	154.7
Yellow-poplar	6.8	5.7	5.6	3.1	3.6	12.2	37.0
Other hardwoods	22.3	7.2	26.4	7.1	7.1	3.3	73.4
Total hardwoods	151.0	107.1	396.6	95.8	85.9	68.7	905.1
All species	158.8	110.4	438.8	108.2	113.1	71.3	1,000.6
	Sampling errors, in percent						
Total softwoods	**	48	**	*	48	**	23
Total hardwoods	24	17	13	17	16	21	7
All species	22	17	12	18	18	21	6

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* Sampling error of 51 to 100 percent.

** More than 100 percent sampling error.

[1] Includes the Allegheny and North-Central subunits.

Pennsylvania, by species and geographic units, 1954-64

(In millions of board feet)

Species	Geographic unit						State total
	Western	South-western	North-Central[1]	South-Central	North-eastern[2]	South-eastern	
Yellow pines	—	0.1	2.5	3.5	—	—	6.1
White pine	6.9	—	—	14.3	—	—	21.2
Hemlock	12.9	—	11.3	—	18.3	—	42.5
Other softwoods	—	—	3.2	—	—	—	3.2
Total softwoods	19.8	.1	17.0	17.8	18.3	—	73.0
Select oak species	16.3	9.0	45.3	8.9	6.9	37.6	124.0
Other oak species	8.0	—	15.0	18.4	8.2	13.8	63.4
Hickory	—	1.7	7.4	.6	—	—	9.7
Yellow birch	—	—	1.2	—	3.4	—	4.6
Sugar maple	1.5	—	12.3	—	.7	—	14.5
Soft maples	14.4	1.6	13.8	2.2	1.9	—	33.9
Beech	2.5	—	16.1	—	5.6	—	24.2
Ash, walnut, cherry	1.2	21.3	18.4	3.6	.9	.3	45.7
Yellow-poplar	1.9	—	—	—	—	12.7	14.6
Other hardwoods	2.1	8.5	19.0	.8	—	.6	31.0
Total hardwoods	47.9	42.1	148.5	34.5	27.6	65.0	365.6
All species	67.7	42.2	165.5	52.3	45.9	65.0	438.6
	Sampling errors, in percent						
Total softwoods	**	**	*	*	*	—	37
Total hardwoods	40	*	39	47	39	42	18
All species	40	*	36	35	42	42	17

* Sampling error of 51 to 100 percent.

** More than 100 percent sampling error.

[1] Includes the Allegheny and North-Central subunits.

[2] Includes the Pocono and Northeastern subunits.

Table 84. — Area of Pennsylvania, by land classes and counties, 1965

(In thousands of acres)

County	Unit	Total land area	Nonforest land area	Forest-land area		
				Noncommercial	Commercial	Sampling error (percent)
Adams	SE	336.6	224.2	1.5	110.9	8
Allegheny	W	467.2	292.8	1.9	172.5	36
Armstrong	W	419.8	207.9	1.9	210.0	21
Beaver	W	282.2	147.6	8.3	126.3	35
Bedford	SW	650.2	207.6	9.8	432.8	8
Berks	SE	553.0	382.6	5.7	164.7	7
Blair	SW	339.8	117.9	1.9	220.0	12
Bradford	NE	734.1	412.9	5.1	316.1	7
Bucks	SE	394.9	294.2	2.0	98.7	10
Butler	W	508.2	246.6	8.9	252.7	21
Cambria	SW	444.8	161.2	5.3	278.3	10
Cameron	A	255.4	7.4	6.0	242.0	2
Carbon	P	259.2	49.1	16.4	193.7	12
Centre	NC	713.6	129.6	35.4	548.6	8
Chester	SE	486.4	368.3	1.3	116.8	9
Clarion	NC	383.3	109.7	6.9	266.7	17
Clearfield	NC	732.1	120.7	25.5	585.9	9
Clinton	NC	577.3	40.3	62.1	474.9	7
Columbia	P	309.8	124.0	.3	185.5	25
Crawford	W	650.2	351.3	1.3	297.6	20
Cumberland	SE	355.2	247.7	1.1	106.4	8
Dauphin	SC	332.8	171.6	5.7	155.5	5
Delaware	—	118.4	118.4	—	—	—
Elk	A	516.5	37.2	7.7	471.6	4
Erie	W	519.7	296.0	.6	223.1	29
Fayette	SW	508.2	190.9	.6	316.7	10
Forest	A	266.2	12.5	2.1	251.6	2
Franklin	SC	482.6	286.3	2.4	193.9	4
Fulton	SC	278.4	88.4	2.4	187.6	4
Greene	W	369.3	183.3	1.0	185.0	23
Huntingdon	SC	570.9	149.1	15.1	406.7	3
Indiana	W	528.0	246.6	—	281.4	19
Jefferson	NC	417.3	99.4	2.3	315.6	16
Juniata	SC	247.7	85.8	1.7	160.2	4
Lackawanna	NE	290.5	117.8	.9	171.8	8
Lancaster	SE	604.2	506.1	.3	97.8	10
Lawrence	W	234.9	142.2	2.5	90.2	49
Lebanon	SE	232.3	161.4	9.2	61.7	10
Lehigh	SE	222.1	171.1	.5	50.5	14
Luzerne	P	570.2	147.8	10.0	412.4	13
Lycoming	NC	777.0	125.7	8.6	642.7	8
McKean	A	638.1	61.4	2.2	574.5	4

Continued

Table 84.—Continued

County	Unit	Total land area	Nonforest land area	Forest-land area: Non-commercial	Forest-land area: Commercial	Sampling error (percent)
Mercer	W	435.8	276.2	—	159.6	37
Mifflin	SC	275.8	98.8	4.7	172.3	4
Monroe	P	391.0	75.4	8.8	306.8	12
Montgomery	SE	314.2	252.5	1.9	59.8	14
Montour	P	83.2	45.9	—	37.3	67
Northampton	SE	239.4	172.2	.5	66.7	13
Northumberland	P	290.6	132.2	—	158.4	26
Perry	SC	352.0	135.6	.6	215.8	4
Philadelphia	—	81.3	81.3	—	—	—
Pike	P	348.8	33.3	15.1	300.4	3
Potter	A	697.6	79.1	6.0	612.5	5
Schuylkill	P	501.1	155.9	1.0	344.2	14
Snyder	SC	210.6	100.7	2.2	107.7	6
Somerset	SW	693.8	250.4	6.3	437.1	9
Sullivan	A	305.9	44.6	4.5	256.8	9
Susquehanna	NE	535.0	270.6	—	264.4	8
Tioga	A	736.0	212.8	4.9	518.3	9
Union	SC	203.5	96.6	4.1	102.8	5
Venango	NC	432.0	70.3	.2	361.5	10
Warren	A	582.4	93.8	2.8	485.8	10
Washington	W	548.5	328.5	—	220.1	32
Wayne	NE	476.2	194.0	1.3	280.9	7
Westmoreland	W	654.7	342.6	3.1	309.0	19
Wyoming	NE	253.5	116.0	—	137.4	10
York	SE	583.0	430.5	1.8	150.7	7
Total		28,804.5	11,732.4	354.2	16,717.9	1.4

Table 85. — Area of commercial forest land in Pennsylvania, by ownership classes and counties, 1965

(In thousands of acres)

County	Public-owned		Private-owned			Total
	National and State Forests[1]	Other public	Forest industry	Farmer-owned	Other private	
Adams	21.6	0.8	5.1	47.5	35.9	110.9
Allegheny	0	2.2	0	16.3	154.0	172.5
Armstrong	0	3.9	.5	60.3	145.3	210.0
Beaver	0	2.4	0	32.9	91.0	126.3
Bedford	28.6	39.2	3.0	199.0	163.0	432.8
Berks	.7	15.0	7.7	43.1	98.2	164.7
Blair	0	44.4	3.3	41.6	130.7	220.0
Bradford	3.6	43.6	9.7	135.3	123.9	316.1
Bucks	0	4.2	0	22.2	72.3	98.7
Butler	0	3.6	0	69.4	179.7	252.7
Cambria	.2	43.2	9.6	46.7	178.6	278.3
Cameron	112.7	17.1	21.0	6.0	85.2	242.0
Carbon	1.0	48.5	0	15.0	129.2	193.7
Centre	106.6	66.6	11.3	76.8	287.3	548.6
Chester	0	1.1	0	42.9	72.8	116.8
Clarion	0	11.9	17.4	48.5	188.9	266.7
Clearfield	74.2	32.7	12.7	41.4	424.9	585.9
Clinton	189.4	22.2	16.2	25.1	222.0	474.9
Columbia	0	18.8	0	45.8	120.9	185.5
Crawford	0	15.3	5.9	150.7	125.7	297.6
Cumberland	33.6	.6	.5	23.1	48.6	106.4
Dauphin	7.2	41.3	1.3	26.7	79.0	155.5

Elk	179.4	62.4	45.7	15.8	168.3	471.6
Erie	0	6.3	1.0	110.7	105.1	223.1
Fayette	14.5	14.1	.7	70.2	217.2	316.7
Forest	112.7	8.7	33.4	9.6	87.2	251.6
Franklin	36.0	20.0	1.8	51.1	85.0	193.9
Fulton	26.8	9.9	4.9	79.0	67.0	187.6
Greene	0	4.4	.1	62.8	117.7	185.0
Huntingdon	51.9	25.2	.8	124.5	204.3	406.7
Indiana	.5	9.1	1.3	109.1	161.4	281.4
Jefferson	8.7	26.7	12.2	43.7	224.3	315.6
Juniata	15.6	11.5	3.1	55.2	74.8	160.2
Lackawanna	5.3	4.7	0	22.8	139.0	171.8
Lancaster	0	7.7	0	51.3	38.8	97.8
Lawrence	0	1.0	0	33.7	55.5	90.2
Lebanon	0	23.6	0	12.4	25.7	61.7
Lehigh	0	3.6	0	15.3	31.6	50.5
Luzerne	1.4	34.7	1.4	48.0	326.9	412.4
Lycoming	168.3	49.7	15.5	77.8	331.4	642.7
McKean	130.0	35.3	108.6	39.0	261.6	574.5
Mercer	0	1.2	.2	90.4	67.8	159.6
Mifflin	52.7	3.0	4.4	43.2	69.0	172.3
Monroe	8.4	44.7	.6	30.8	222.3	306.8
Montgomery	0	2.0	0	8.1	49.7	59.8
Montour	0	.4	0	11.3	25.6	37.3
Northampton	0	3.9	0	15.5	47.3	66.7
Northumberland	0	9.4	.1	34.9	114.0	158.4
Perry	40.5	5.5	3.0	72.8	94.0	215.8
Pike	50.4	20.7	.4	21.3	207.6	300.4
Potter	260.7	19.7	93.2	81.8	157.1	612.5

Continued

Table 85. — Continued

County	Public-owned		Private-owned			Total
	National and State Forests[1]	Other public	Forest industry	Farmer-owned	Other private	
Schuylkill	7.6	49.1	.1	41.0	246.4	344.2
Snyder	26.5	3.2	3.1	39.3	35.6	107.7
Somerset	26.1	24.9	8.5	179.3	198.3	437.1
Sullivan	37.0	47.7	21.7	29.9	120.5	256.8
Susquehanna	0	12.9	2.5	109.0	140.0	264.4
Tioga	145.0	21.8	19.3	100.0	232.2	518.3
Union	53.7	1.3	5.5	16.9	25.4	102.8
Venango	0	17.8	22.7	41.1	279.9	361.5
Warren	118.0	34.4	52.9	65.3	215.2	485.8
Washington	0	5.0	.2	76.1	138.8	220.1
Wayne	0	13.3	.7	89.5	177.4	280.9
Westmoreland	3.4	12.6	.4	81.3	211.3	309.0
Wyoming	1.3	27.7	10.9	40.0	57.5	137.4
York	0	3.2	3.7	77.6	66.2	150.7
Total	2,161.8	1,222.6	609.8	3,644.7	9,079.0	16,717.9

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[1] Includes 113,300 acres of National Forest land in Elk County, 110,600 acres in Forest County, 124,500 acres in McKean County and 118,000 acres in Warren County.

Table 86. — Area of commercial forest land in Pennsylvania, by stand-size classes and counties, 1965

(In thousands of acres)

County	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Non-stocked areas	Total
Adams	60.6	35.3	10.8	4.2	110.9
Allegheny	80.0	26.5	50.7	15.3	172.5
Armstrong	112.6	34.5	51.6	11.3	210.0
Beaver	62.2	23.2	33.1	7.8	126.3
Bedford	215.7	129.5	76.5	11.1	432.8
Berks	87.3	47.7	19.5	10.2	164.7
Blair	119.7	57.6	37.6	5.1	220.0
Bradford	120.3	139.8	42.0	14.0	316.1
Bucks	51.3	28.7	12.2	6.5	98.7
Butler	135.2	42.2	61.9	13.4	252.7
Cambria	155.8	72.8	44.1	5.6	278.3
Cameron	108.2	117.8	15.0	1.0	242.0
Carbon	53.5	83.1	52.6	4.5	193.7
Centre	228.6	220.9	91.9	7.2	548.6
Chester	72.0	29.1	10.2	5.5	116.8
Clarion	86.6	84.7	84.9	10.5	266.7
Clearfield	246.1	224.0	104.8	11.0	585.9
Clinton	200.9	212.2	57.8	4.0	474.9
Columbia	47.0	61.3	71.5	5.7	185.5
Crawford	139.7	49.1	88.9	19.9	297.6
Cumberland	54.8	37.7	10.3	3.6	106.4
Dauphin	94.9	46.5	13.6	.5	155.5
Elk	185.3	210.5	64.6	11.2	471.6
Erie	107.8	40.2	59.7	15.4	223.1
Fayette	153.0	92.0	62.4	9.3	316.7
Forest	91.7	133.5	20.7	5.7	251.6
Franklin	111.0	66.7	15.6	.6	193.9
Fulton	102.2	67.0	17.5	.9	187.6
Greene	83.3	35.8	55.3	10.6	185.0
Huntingdon	197.0	157.1	49.8	2.8	406.7
Indiana	144.5	50.0	73.0	13.9	281.4
Jefferson	111.3	108.4	86.7	9.2	315.6
Juniata	98.2	52.0	9.6	.4	160.2
Lackawanna	61.8	79.7	22.7	7.6	171.8
Lancaster	65.0	22.6	6.6	3.6	97.8
Lawrence	49.7	12.0	21.3	7.2	90.2
Lebanon	44.7	13.0	2.7	1.3	61.7
Lehigh	30.7	12.4	5.1	2.3	50.5

Continued

Table 86.—Continued

County	Sawtimber stands	Poletimber stands	Sapling-seedling stands	Non-stocked areas	Total
Luzerne	102.8	164.0	132.0	13.6	412.4
Lycoming	275.2	282.3	80.7	4.5	642.7
McKean	284.9	188.3	90.3	11.0	574.5
Mercer	67.8	25.7	51.4	14.7	159.6
Mifflin	103.2	60.4	8.4	.3	172.3
Monroe	77.1	129.5	90.2	10.0	306.8
Montgomery	31.9	15.8	8.1	4.0	59.8
Montour	12.8	12.3	11.9	.3	37.3
Northampton	40.6	16.7	6.3	3.1	66.7
Northumberland	48.3	55.6	51.9	2.6	158.4
Perry	122.7	75.0	17.2	.9	215.8
Pike	90.5	157.7	48.0	4.2	300.4
Potter	233.5	302.4	70.9	5.7	612.5
Schuylkill	75.7	110.3	143.4	14.8	344.2
Snyder	54.8	41.2	11.1	.6	107.7
Somerset	215.8	123.0	84.2	14.1	437.1
Sullivan	123.2	100.6	30.9	2.1	256.8
Susquehanna	97.8	111.8	40.5	14.3	264.4
Tioga	172.2	215.1	120.6	10.4	518.3
Union	48.3	47.6	6.7	.2	102.8
Venango	143.2	131.1	78.5	8.7	361.5
Warren	224.9	181.6	72.7	6.6	485.8
Washington	91.5	47.4	64.5	16.7	220.1
Wayne	103.5	121.6	41.4	14.4	280.9
Westmoreland	167.7	50.3	72.9	18.1	309.0
Wyoming	47.5	60.4	21.8	7.7	137.4
York	104.7	31.9	10.0	4.1	150.7
Total	7,332.3	5,816.7	3,081.3	487.6	16,717.9

Table 87. — Area of sawtimber stands in Pennsylvania, by stocking classes and counties, 1965

(In thousands of acres)

County	Growing-stock stocking class			Total for sawtimber stands
	Over 70 percent	40 to 70 percent	Under 40 percent	
Adams	20.9	33.7	6.0	60.6
Allegheny	16.4	45.2	18.4	80.0
Armstrong	24.2	66.5	21.9	112.6
Beaver	11.6	37.7	12.9	62.2
Bedford	68.6	115.7	31.4	215.7
Berks	26.9	50.2	10.2	87.3
Blair	39.9	63.7	16.1	119.7
Bradford	26.4	74.9	19.0	120.3
Bucks	15.7	29.3	6.3	51.3
Butler	31.3	79.0	24.9	135.2
Cambria	53.0	83.5	19.3	155.8
Cameron	44.7	60.3	3.2	108.2
Carbon	25.8	21.5	6.2	53.5
Centre	84.2	118.7	25.7	228.6
Chester	24.7	40.0	7.3	72.0
Clarion	31.1	42.1	13.4	86.6
Clearfield	91.0	126.4	28.7	246.1
Clinton	84.9	99.8	16.2	200.9
Columbia	27.3	14.9	4.8	47.0
Crawford	29.3	76.1	34.3	139.7
Cumberland	19.1	29.8	5.9	54.8
Dauphin	37.0	49.7	8.2	94.9
Elk	96.7	77.0	11.6	185.3
Erie	20.1	65.1	22.6	107.8
Fayette	47.1	83.1	22.8	153.0
Forest	53.4	31.3	7.0	91.7
Franklin	43.9	57.1	10.0	111.0
Fulton	38.3	52.9	11.0	102.2
Greene	13.6	48.1	21.6	83.3
Huntingdon	63.7	103.9	29.4	197.0
Indiana	27.4	85.9	31.2	144.5
Jefferson	41.2	55.0	15.1	111.3
Juniata	37.8	51.6	8.8	98.2
Lackawanna	13.5	37.3	11.0	61.8
Lancaster	21.8	37.1	6.1	65.0
Lawrence	14.0	27.9	7.8	49.7
Lebanon	18.6	23.4	2.7	44.7

Continued

Table 87.—Continued

County	Growing-stock stocking class			Total for sawtimber stands
	Over 70 percent	40 to 70 percent	Under 40 percent	
Lehigh	9.2	18.3	3.2	30.7
Luzerne	53.1	40.8	8.9	102.8
Lycoming	102.7	146.8	25.7	275.2
McKean	157.1	112.5	15.3	284.9
Mercer	14.2	35.8	17.8	67.8
Mifflin	43.8	51.6	7.8	103.2
Monroe	38.6	32.5	6.0	77.1
Montgomery	9.1	18.2	4.6	31.9
Montour	9.2	3.1	.5	12.8
Northampton	13.3	23.3	4.0	40.6
Northumberland	28.4	15.2	4.7	48.3
Perry	47.9	63.2	11.6	122.7
Pike	40.9	42.0	7.6	90.5
Potter	90.9	131.5	11.1	233.5
Schuylkill	41.7	25.5	8.5	75.7
Snyder	20.7	27.7	6.4	54.8
Somerset	67.0	119.3	29.5	215.8
Sullivan	52.9	65.5	4.8	123.2
Susquehanna	21.1	60.6	16.1	97.8
Tioga	67.1	95.9	9.2	172.2
Union	19.3	24.2	4.8	48.3
Venango	49.1	74.6	19.5	143.2
Warren	132.4	84.2	8.3	224.9
Washington	11.7	57.7	22.1	91.5
Wayne	22.5	63.9	17.1	103.5
Westmoreland	38.7	99.3	29.7	167.7
Wyoming	9.8	28.5	9.2	47.5
York	35.1	61.2	8.4	104.7
Total	2,632.6	3,818.3	881.4	7,332.3

Table 88. — Area of commercial forest land in Pennsylvania, by forest types and counties, 1965
(In thousands of acres)

County	Forest type							Total
	White pine	Pitch-Virginia pine[1]	Oak-hickory	Other oak types	Elm-ash-red maple	Maple-beech-birch	Aspen-birch	
Adams	0.4	1.1	80.9	2.0	12.9	11.4	2.2	110.9
Allegheny	7.6	1.4	46.1	4.1	38.3	28.6	46.4	172.5
Armstrong	10.2	1.4	62.4	4.3	51.6	38.1	42.0	210.0
Beaver	5.9	.8	35.2	2.4	29.0	24.6	28.4	126.3
Bedford	10.9	5.6	248.9	20.1	39.8	84.4	23.1	432.8
Berks	—	3.0	98.6	4.3	26.7	26.1	6.0	164.7
Blair	4.8	2.5	121.5	10.9	22.5	46.4	11.4	220.0
Bradford	32.5	—	75.6	—	51.3	114.2	42.5	316.1
Bucks	—	1.9	56.8	2.8	17.1	16.4	3.7	98.7
Butler	12.2	1.7	72.5	4.9	60.8	49.8	50.8	252.7
Cambria	5.9	2.8	154.9	14.2	27.0	60.7	12.8	278.3
Cameron	9.9	—	87.9	.8	27.0	102.5	13.9	242.0
Carbon	21.3	7.8	108.9	5.4	20.0	8.0	22.3	193.7
Centre	37.8	13.0	351.7	6.3	44.2	52.2	43.4	548.6
Chester	—	1.3	78.1	2.7	17.3	14.7	2.7	116.8
Clarion	22.5	12.0	140.1	4.8	17.7	25.7	43.9	266.7
Clearfield	39.9	13.3	347.9	7.5	51.4	71.8	54.1	585.9
Clinton	30.5	4.8	320.9	3.1	29.8	58.9	26.9	474.9
Columbia	24.9	7.5	88.0	4.7	15.9	5.3	39.2	185.5
Crawford	13.5	2.8	81.1	8.3	67.6	54.3	70.0	297.6

Continued

Table 88.—Continued

County	Forest type							Total
	White pine	Pitch-Virginia pine[1]	Oak-hickory	Other oak types	Elm-ash-red maple	Maple-beech-birch	Aspen-birch	
Cumberland	.4	.8	80.3	1.9	11.6	9.7	1.7	106.4
Dauphin	2.7	2.2	125.5	5.4	8.1	11.1	.5	155.5
Elk	22.9	—	98.2	3.6	57.1	225.1	64.7	471.6
Erie	10.3	1.4	61.2	4.4	50.5	42.5	52.8	223.1
Fayette	7.9	4.7	175.2	18.0	28.9	63.8	18.2	316.7
Forest	12.4	—	48.1	7.5	28.8	125.7	29.1	251.6
Franklin	3.7	2.5	160.3	6.0	8.5	12.3	.6	193.9
Fulton	3.5	3.2	150.0	6.9	10.4	12.7	.9	187.6
Greene	8.5	1.6	50.2	4.9	41.3	36.5	42.0	185.0
Huntingdon	9.6	9.5	306.7	18.5	29.4	30.2	2.8	406.7
Indiana	13.7	2.1	83.4	6.3	68.1	52.1	55.7	281.4
Jefferson	31.1	10.9	170.7	4.8	24.6	29.8	43.7	315.6
Juniata	2.7	1.8	130.9	5.3	8.2	10.9	.4	160.2
Lackawanna	15.7	—	37.6	—	30.2	61.7	26.6	171.8
Lancaster	—	.7	69.5	2.2	13.6	10.4	1.4	97.8
Lawrence	4.1	.5	25.0	1.5	21.0	16.9	21.2	90.2
Lebanon	—	.3	50.7	.6	5.4	4.1	.6	61.7
Lehigh	—	.7	34.7	1.1	6.6	6.1	1.3	50.5
Luzerne	43.1	15.6	222.0	8.9	43.5	17.3	62.0	412.4
Lycoming	37.3	12.2	392.2	3.9	51.8	104.4	40.9	642.7
McKean	31.0	—	93.7	2.3	85.9	274.5	87.1	574.5
Mercer	6.7	1.5	39.7	4.4	33.1	28.9	45.3	159.6
Mifflin	2.8	1.3	148.6	3.9	5.2	10.2	.3	172.3

Monroe	28.6	10.9	173.6	6.1	34.4	14.7	38.5	306.8
Montgomery	—	1.1	34.2	1.8	10.5	10.0	2.2	59.8
Montour	6.4	.6	14.2	.3	3.8	2.4	9.6	37.3
Northampton	—	.9	45.7	1.4	8.9	8.1	1.7	66.7
Northumberland	25.7	5.4	71.0	3.9	13.7	5.6	33.1	158.4
Perry	4.4	3.3	176.0	6.9	9.9	14.4	.9	215.8
Pike	24.5	7.4	194.8	4.7	31.1	21.6	16.3	300.4
Potter	31.5	—	103.7	1.9	69.1	339.2	67.1	612.5
Schuylkill	38.4	15.9	173.6	9.2	30.3	8.7	68.1	344.2
Snyder	2.0	2.1	85.5	3.8	5.5	8.2	.6	107.7
Somerset	9.9	7.0	228.3	24.5	36.4	106.2	24.8	437.1
Sullivan	14.5	—	47.1	1.0	48.2	115.8	30.2	256.8
Susquehanna	28.1	—	63.3	—	43.0	88.0	42.0	264.4
Tioga	29.4	—	106.5	1.6	62.8	205.5	112.5	518.3
Union	1.6	.8	88.6	1.9	3.1	6.6	.2	102.8
Venango	33.5	8.6	199.9	5.0	34.8	37.0	42.7	361.5
Warren	23.1	—	88.5	14.1	81.3	210.8	68.0	485.8
Washington	9.6	1.3	54.4	4.0	44.3	47.8	58.7	220.1
Wayne	29.1	—	66.4	—	46.9	93.8	44.7	280.9
Westmoreland	15.1	1.9	92.9	5.8	74.5	55.7	63.1	309.0
Wyoming	13.7	—	30.8	—	24.8	42.3	25.8	137.4
York	—	1.0	119.4	2.0	14.4	11.8	2.1	150.7
Total	929.9	226.4	7,670.8	335.8	2,071.4	3,545.2	1,938.4	16,717.9

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[1] Includes small areas of the spruce forest type, a total of 18,800 acres.

Table 89. — Net cubic-foot volume on commercial forest land in Pennsylvania, by tree classes and counties, 1965

(In millions of cubic feet)

County	Saw-timber trees	Pole-timber trees	Total growing stock	Cull trees	Total, all trees
Adams	69.7	50.6	120.3	14.6	134.9
Allegheny	67.5	68.3	135.8	22.4	158.2
Armstrong	98.6	95.8	194.4	28.6	223.0
Beaver	53.3	54.8	108.1	17.1	125.2
Bedford	206.6	217.2	423.8	56.7	480.5
Berks	100.8	67.8	168.6	24.2	192.8
Blair	120.4	115.6	236.0	31.5	267.5
Bradford	108.8	207.8	316.6	53.6	370.2
Bucks	56.8	39.6	96.4	14.5	110.9
Butler	125.0	112.0	237.0	34.5	271.5
Cambria	165.6	149.7	315.3	41.4	356.7
Cameron	134.2	215.0	349.2	31.5	380.7
Carbon	59.4	114.2	173.6	14.9	188.5
Centre	234.7	328.8	563.5	62.7	626.2
Chester	86.5	53.2	139.7	17.6	157.3
Clarion	93.1	126.7	219.8	28.9	248.7
Clearfield	260.2	357.7	617.9	71.0	688.9
Clinton	188.2	283.8	472.0	41.6	513.6
Columbia	53.8	91.8	145.6	11.8	157.4
Crawford	119.3	115.5	234.8	38.4	273.2
Cumberland	61.3	49.6	110.9	12.8	123.7
Dauphin	113.0	90.9	203.9	22.1	226.0
Elk	254.8	353.6	608.4	68.3	676.7
Erie	92.3	95.3	187.6	30.0	217.6
Fayette	142.0	153.8	295.8	40.2	336.0
Forest	138.3	201.4	339.7	42.2	381.9
Franklin	128.5	110.0	238.5	24.7	263.2
Fulton	118.4	104.0	222.4	23.9	246.3
Greene	67.2	73.0	140.2	23.9	164.1
Huntingdon	216.3	205.7	422.0	48.3	470.3
Indiana	120.5	126.0	246.5	38.0	284.5
Jefferson	109.5	156.5	266.0	33.2	299.2
Juniata	116.1	93.3	209.4	22.0	231.4
Lackawanna	56.6	110.2	166.8	28.7	195.5
Lancaster	77.9	47.0	124.9	15.2	140.1
Lawrence	49.3	39.6	88.9	13.1	102.0
Lebanon	60.3	32.6	92.9	9.1	102.0
Lehigh	37.7	22.1	59.8	7.6	67.4

Continued

Table 89.—Continued

County	Saw-timber trees	Pole-timber trees	Total growing stock	Cull trees	Total, all trees
Luzerne	126.2	231.0	357.2	30.7	387.9
Lycoming	281.7	407.7	689.4	69.1	758.5
McKean	372.7	448.0	820.7	101.9	922.6
Mercer	57.9	56.5	114.4	20.7	135.1
Mifflin	125.3	100.8	226.1	21.4	247.5
Monroe	95.3	178.4	273.7	23.8	297.5
Montgomery	37.7	23.4	61.1	8.7	69.8
Montour	17.4	22.8	40.2	2.7	42.9
Northampton	49.8	29.8	79.6	9.9	89.5
Northumberland	53.4	88.4	141.8	10.6	152.4
Perry	146.6	122.7	269.3	27.9	297.2
Pike	103.1	203.5	306.6	25.6	332.2
Potter	303.1	524.1	827.2	79.1	906.3
Schuylkill	84.3	154.3	238.6	21.2	259.8
Snyder	61.4	56.5	117.9	12.8	130.7
Somerset	213.4	214.0	427.4	56.5	483.9
Sullivan	194.3	235.2	429.5	43.7	473.2
Susquehanna	88.8	166.4	255.2	44.0	299.2
Tioga	239.7	378.2	617.9	71.4	689.3
Union	52.4	55.3	107.7	10.8	118.5
Venango	142.4	203.9	346.3	43.2	389.5
Warren	366.1	394.5	760.6	82.3	842.9
Washington	74.7	86.5	161.2	29.5	190.7
Wayne	94.2	178.2	272.4	46.9	319.3
Westmoreland	149.9	140.1	290.0	42.0	332.0
Wyoming	42.6	82.9	125.5	22.5	148.0
York	135.6	74.5	210.1	22.9	233.0
Total	8,072.5	9,788.1	17,860.6	2,142.6	20,003.2

Table 90. — Volume of growing stock in Pennsylvania, by stand-size classes and counties, 1965

(In millions of cubic feet)

County	Stand-size class			Total, all stands	Sampling error (percent)
	Saw-timber stands	Pole-timber stands	Other stands		
Adams	92.4	25.9	2.0	120.3	16
Allegheny	107.7	19.7	8.4	135.8	26
Armstrong	158.5	26.8	9.1	194.4	20
Beaver	83.3	18.6	6.2	108.1	29
Bedford	299.9	108.9	15.0	423.8	9
Berks	131.4	33.4	3.8	168.6	16
Blair	176.6	52.3	7.1	236.0	13
Bradford	160.6	150.4	5.6	316.6	11
Bucks	74.3	19.6	2.5	96.4	21
Butler	192.9	32.9	11.2	237.0	18
Cambria	241.5	65.7	8.1	315.3	10
Cameron	199.2	147.0	3.0	349.2	9
Carbon	79.9	87.1	6.6	173.6	25
Centre	336.3	207.9	19.3	563.5	9
Chester	114.2	23.3	2.2	139.7	19
Clarion	127.2	72.9	19.7	219.8	17
Clearfield	377.3	217.1	23.5	617.9	9
Clinton	268.0	190.0	14.0	472.0	9
Columbia	76.9	62.0	6.7	145.6	52
Crawford	184.6	35.6	14.6	234.8	15
Cumberland	82.1	26.8	2.0	110.9	20
Dauphin	159.6	42.3	2.0	203.9	11
Elk	343.8	255.2	9.4	608.4	7
Erie	144.5	32.0	11.1	187.6	25
Fayette	208.1	75.8	11.9	295.8	11
Forest	171.7	164.2	3.8	339.7	9
Franklin	179.3	56.6	2.6	238.5	10
Fulton	162.6	56.7	3.1	222.4	10
Greene	102.9	27.5	9.8	140.2	27
Huntingdon	285.0	128.3	8.7	422.0	7
Indiana	194.4	39.1	13.0	246.5	19
Jefferson	152.5	92.6	20.9	266.0	14
Juniata	160.1	47.4	1.9	209.4	10
Lackawanna	81.0	82.3	3.5	166.8	14
Lancaster	103.3	20.1	1.5	124.9	23
Lawrence	76.1	9.2	3.6	88.9	39

Continued

Table 90.—Continued

County	Stand-size class			Total, all stands	Sampling error (percent)
	Saw-timber stands	Pole-timber stands	Other stands		
Lebanon	79.3	13.1	.5	92.9	21
Lehigh	48.8	10.1	.9	59.8	28
Luzerne	168.8	174.2	14.2	357.2	25
Lycoming	400.1	272.0	17.3	689.4	8
McKean	539.6	268.5	12.6	820.7	6
Mercer	87.4	18.6	8.4	114.4	21
Miffiin	171.6	52.9	1.6	226.1	9
Monroe	126.1	137.5	10.1	273.7	23
Montgomery	49.0	10.5	1.6	61.1	28
Montour	25.7	13.7	.8	40.2	99
Northampton	64.9	13.5	1.2	79.6	26
Northumberland	79.8	57.2	4.8	141.8	48
Perry	199.8	66.5	3.0	269.3	9
Pike	133.7	165.8	7.1	306.6	10
Potter	434.8	382.3	10.1	827.2	7
Schuylkill	117.4	107.3	13.9	238.6	33
Snyder	83.4	32.7	1.8	117.9	12
Somerset	311.8	99.6	16.0	427.4	9
Sullivan	271.9	153.1	4.5	429.5	9
Susquehanna	130.1	120.4	4.7	255.2	12
Tioga	329.3	277.0	11.6	617.9	8
Union	69.7	36.8	1.2	107.7	14
Venango	203.6	122.8	19.9	346.3	11
Warren	481.7	270.1	8.8	760.6	6
Washington	109.1	39.2	12.9	161.2	24
Wayne	137.7	129.7	5.0	272.4	11
Westmoreland	238.4	38.7	12.9	290.0	18
Wyoming	61.2	61.5	2.8	125.5	17
York	176.1	32.0	2.0	210.1	16
Total	11,420.5	5,930.5	509.6	17,860.6	1.3

Table 91. — Volume of sawtimber in Pennsylvania, by stand-size classes and counties, 1965

(In millions of board feet)

County	Stand-size class: Saw-timber stands	Stand-size class: Pole-timber stands	Stand-size class: Other stands	Total, all stands	Sampling error (percent)
Adams	178.6	15.7	2.8	197.1	23
Allegheny	197.1	9.1	5.9	212.1	32
Armstrong	289.3	12.7	7.6	309.6	26
Beaver	152.9	9.0	5.4	167.3	36
Bedford	560.1	69.9	13.3	643.3	14
Berks	248.2	18.9	5.4	272.5	23
Blair	331.2	32.0	6.0	369.2	19
Bradford	301.3	81.2	6.7	389.2	18
Bucks	138.7	11.0	3.6	153.3	30
Butler	368.4	16.1	9.7	394.2	23
Cambria	463.3	40.6	6.9	510.8	16
Cameron	375.1	91.8	2.7	469.6	18
Carbon	160.6	48.2	6.6	215.4	49
Centre	670.9	113.6	23.5	808.0	15
Chester	219.4	13.1	3.1	235.6	27
Clarion	252.5	31.1	24.4	308.0	28
Clearfield	737.1	108.8	28.0	873.9	15
Clinton	560.6	110.4	15.4	686.4	15
Columbia	163.4	33.4	6.8	203.6	91
Crawford	348.1	16.3	11.1	375.5	19
Cumberland	162.3	17.3	2.8	182.4	29
Dauphin	303.4	29.2	2.5	335.1	16
Elk	661.3	170.2	10.9	842.4	12
Erie	264.6	15.4	9.4	289.4	31
Fayette	381.0	46.6	10.6	438.2	17
Forest	324.6	114.5	3.7	442.8	16
Franklin	345.8	42.8	3.6	392.2	15
Fulton	313.6	43.6	3.9	361.1	16
Greene	189.5	12.9	8.4	210.8	34
Huntingdon	559.8	103.3	10.4	673.5	10
Indiana	347.5	18.4	11.2	377.1	23
Jefferson	302.0	41.2	24.8	368.0	21
Juniata	314.2	35.7	2.5	352.4	14
Lackawanna	155.6	44.6	4.1	204.3	22
Lancaster	197.8	11.3	2.2	211.3	33
Lawrence	148.7	4.5	2.6	155.8	43

Continued

Table 91.—Continued

County	Stand-size class			Total, all stands	Sampling error (percent)
	Saw-timber stands	Other stands	Pole-timber stands		
Lebanon	155.9	7.6	.7	164.2	30
Lehigh	95.0	5.6	1.3	101.9	38
Luzerne	351.3	97.8	14.2	463.3	47
Lycoming	815.8	150.2	20.1	986.1	13
McKean	1,017.7	177.6	15.1	1,210.4	11
Mercer	168.1	8.4	5.9	182.4	25
Miffiin	354.8	45.8	2.4	403.0	14
Monroe	260.1	77.4	10.0	347.5	45
Montgomery	96.4	5.6	2.2	104.2	36
Montour	58.6	8.0	.6	67.2	**
Northampton	125.6	7.6	1.7	134.9	39
Northumberland	169.6	30.0	4.4	204.0	81
Perry	399.3	53.6	3.9	456.8	21
Pike	273.1	96.4	6.5	376.0	21
Potter	820.4	236.9	10.7	1,068.0	13
Schuylkill	244.6	56.3	14.8	315.7	60
Snyder	163.2	26.8	2.3	192.3	18
Somerset	590.2	61.2	14.3	665.7	14
Sullivan	550.5	103.9	4.4	658.8	15
Susquehanna	245.4	65.8	4.9	316.1	20
Tioga	636.2	178.3	14.3	828.8	14
Union	143.6	33.0	1.6	178.2	31
Venango	392.7	57.4	22.7	472.8	18
Warren	964.6	204.4	10.1	1,179.1	10
Washington	202.7	19.1	11.8	233.6	32
Wayne	259.7	70.4	5.5	335.6	18
Westmoreland	440.8	18.7	10.6	470.1	22
Wyoming	116.7	32.7	2.8	152.2	28
York	347.8	18.0	2.6	368.4	22
Total	22,148.9	3,588.9	530.9	26,268.7	1.7

** Sampling error of more than 100 percent.

Table 92. — Volume of growing stock in Pennsylvania, by species groups and counties, 1965

(In millions of cubic feet)

County	Oaks	Other hardwoods	Total hardwoods	Softwoods	All species
Adams	65.9	48.4	114.3	6.0	120.3
Allegheny	34.6	90.5	125.1	10.7	135.8
Armstrong	50.9	127.7	178.6	15.8	194.4
Beaver	26.7	73.1	99.8	8.3	108.1
Bedford	204.5	204.2	408.7	15.1	423.8
Berks	83.8	78.1	161.9	6.7	168.6
Blair	111.4	118.4	229.8	6.2	236.0
Bradford	61.7	219.1	280.8	35.8	316.6
Bucks	46.1	46.2	92.3	4.1	96.4
Butler	62.5	157.4	219.9	17.1	237.0
Cambria	149.4	158.3	307.7	7.6	315.3
Cameron	89.5	239.8	329.3	19.9	349.2
Carbon	79.8	65.6	145.4	28.2	173.6
Centre	314.1	193.4	507.5	56.0	563.5
Chester	70.8	64.0	134.8	4.9	139.7
Clarion	111.4	81.8	193.2	26.6	219.8
Clearfield	332.2	226.3	558.5	59.4	617.9
Clinton	260.1	165.3	425.4	46.6	472.0
Columbia	56.9	54.4	111.3	34.3	145.6
Crawford	59.4	158.1	217.5	17.3	234.8
Cumberland	62.6	41.9	104.5	6.4	110.9
Dauphin	134.4	54.2	188.6	15.3	203.9
Elk	116.9	455.6	572.5	35.9	608.4
Erie	46.3	126.8	173.1	14.5	187.6
Fayette	140.7	144.5	285.2	10.6	295.8
Forest	67.6	248.4	316.0	23.7	339.7
Franklin	160.6	60.1	220.7	17.8	238.5
Fulton	147.8	56.8	204.6	17.8	222.4
Greene	33.0	96.8	129.8	10.4	140.2
Huntingdon	275.3	109.8	385.1	36.9	422.0
Indiana	62.1	163.9	226.0	20.5	246.5
Jefferson	130.0	101.7	231.7	34.3	266.0
Juniata	139.6	54.4	194.0	15.4	209.4
Lackawanna	30.7	117.2	147.9	18.9	166.8
Lancaster	64.6	56.0	120.6	4.3	124.9
Lawrence	24.5	58.0	82.5	6.4	88.9
Lebanon	50.3	39.9	90.2	2.7	92.9
Lehigh	32.2	25.7	57.9	1.9	59.8

Continued

Table 92.—Continued

County	Oaks	Other hardwoods	Total hardwoods	Softwoods	All species
Luzerne	152.6	143.5	296.1	61.1	357.2
Lycoming	338.2	288.9	627.1	62.3	689.4
McKean	140.1	631.3	771.4	49.3	820.7
Mercer	27.9	78.5	106.4	8.0	114.4
Miffiin	153.3	55.2	208.5	17.6	226.1
Monroe	121.1	110.9	232.0	41.7	273.7
Montgomery	29.9	29.2	59.1	2.0	61.1
Montour	12.6	17.6	30.2	10.0	40.2
Northampton	42.1	34.8	76.9	2.7	79.6
Northumberland	54.2	52.5	106.7	35.1	141.8
Perry	182.7	67.5	250.2	19.1	269.3
Pike	150.3	117.2	267.5	39.1	306.6
Potter	134.6	646.7	781.3	45.9	827.2
Schuylkill	98.9	87.3	186.2	52.4	238.6
Snyder	77.8	30.1	107.9	10.0	117.9
Somerset	197.3	215.3	412.6	14.8	427.4
Sullivan	78.8	325.2	404.0	25.5	429.5
Susquehanna	52.7	172.8	225.5	29.7	255.2
Tioga	119.7	459.7	579.4	38.5	617.9
Union	73.6	23.9	97.5	10.2	107.7
Venango	171.1	135.7	306.8	39.5	346.3
Warren	176.1	528.6	704.7	55.9	760.6
Washington	34.6	115.5	150.1	11.1	161.2
Wayne	55.2	185.7	240.9	31.5	272.4
Westmoreland	79.1	188.3	267.4	22.6	290.0
Wyoming	24.7	85.8	110.5	15.0	125.5
York	117.5	86.6	204.1	6.0	210.1
Total	6,887.6	9,496.1	16,383.7	1,476.9	17,860.6

Table 93. — Volume of sawtimber in Pennsylvania, by species groups and counties, 1965
(In millions of board feet)

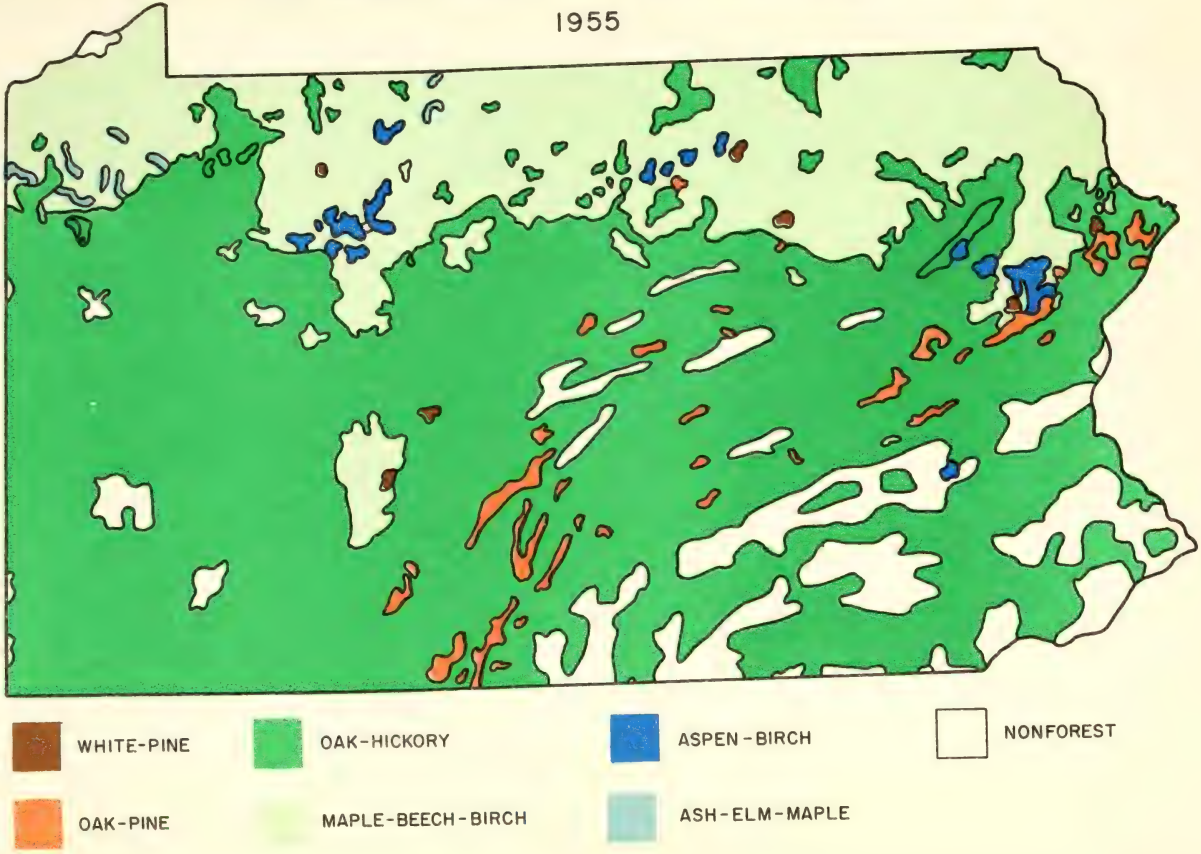
County	Oaks	Other hardwoods	Total hardwoods	Softwoods	All species
Adams	107.1	76.4	183.5	13.6	197.1
Allegheny	75.2	124.3	199.5	12.6	212.1
Armstrong	110.4	180.9	291.3	18.3	309.6
Beaver	56.4	100.9	157.3	10.0	167.3
Bedford	347.9	267.2	615.1	28.2	643.3
Berks	138.7	117.4	256.1	16.4	272.5
Blair	200.5	158.7	359.2	10.0	369.2
Bradford	81.9	245.4	327.3	61.9	389.2
Bucks	75.8	68.0	143.8	9.5	153.3
Butler	142.7	230.5	373.2	21.0	394.2
Cambria	280.4	217.7	498.1	12.7	510.8
Cameron	143.5	280.8	424.3	45.3	469.6
Carbon	75.0	65.4	140.4	75.0	215.4
Centre	474.8	200.9	675.7	132.3	808.0
Chester	122.3	101.8	224.1	11.5	235.6
Clarion	169.0	80.7	249.7	58.3	308.0
Clearfield	498.3	231.0	729.3	144.6	873.9
Clinton	403.6	163.1	566.7	119.7	686.4
Columbia	54.4	60.8	115.2	88.4	203.6
Crawford	133.0	221.6	354.6	20.9	375.5
Cumberland	101.9	65.9	167.8	14.6	182.4
Dauphin	223.5	74.9	298.4	36.7	335.1
Elk	191.8	563.1	754.9	87.5	842.4
Erie	98.0	174.1	272.1	17.3	289.4
Fayette	232.6	187.1	419.7	18.5	438.2
Forest	108.6	280.2	388.8	54.0	442.8
Franklin	266.3	84.5	350.8	41.4	392.2
Fulton	242.6	75.5	318.1	43.0	361.1
Greene	69.1	129.0	198.1	12.7	210.8
Huntingdon	448.6	138.7	587.3	86.2	673.5
Indiana	128.8	224.8	353.6	23.5	377.1
Jefferson	196.9	98.7	295.6	72.4	368.0
Juniata	239.8	75.3	315.1	37.3	352.4
Lackawanna	38.9	131.7	170.6	33.7	204.3
Lancaster	109.4	91.8	201.2	10.1	211.3
Lawrence	57.8	90.4	148.2	7.6	155.8
Lebanon	90.6	66.6	157.2	7.0	164.2
Lehigh	56.3	41.0	97.3	4.6	101.9
Luzerne	141.4	159.0	300.4	162.9	463.3

Continued

Table 93—Continued

County	Oaks	Other hardwoods	Total hardwoods	Softwoods	All species
Lycoming	505.8	337.8	843.6	142.5	986.1
McKean	253.5	834.0	1,087.5	122.9	1,210.4
Mercer	62.6	110.0	172.6	9.8	182.4
Mifflin	275.9	79.0	354.9	48.1	403.0
Monroe	112.6	122.2	234.8	112.7	347.5
Montgomery	56.2	43.7	99.9	4.3	104.2
Montour	14.0	25.5	39.5	27.7	67.2
Northampton	72.9	55.5	128.4	6.5	134.9
Northumberland	52.8	59.2	112.0	92.0	204.0
Perry	311.5	95.3	406.8	50.0	456.8
Pike	140.1	131.7	271.8	104.2	376.0
Potter	214.5	753.2	967.7	100.3	1,068.0
Schuylkill	97.6	84.9	182.5	133.2	315.7
Snyder	127.5	39.4	166.9	25.4	192.3
Somerset	358.6	284.1	642.7	23.0	665.7
Sullivan	148.6	450.0	598.6	60.2	658.8
Susquehanna	79.6	185.3	264.9	51.2	316.1
Tioga	186.5	557.3	743.8	85.0	828.8
Union	117.6	30.6	148.2	30.0	178.2
Venango	253.5	135.9	389.4	83.4	472.8
Warren	343.5	699.0	1,042.5	136.6	1,179.1
Washington	68.3	151.2	219.5	14.1	233.6
Wayne	81.1	199.6	280.7	54.9	335.6
Westmoreland	172.7	270.4	443.1	27.0	470.1
Wyoming	36.1	89.3	125.4	26.8	152.2
York	208.6	144.8	353.4	15.0	368.4
Total	11,086.0	11,914.7	23,000.7	3,268.0	26,268.7

THE MAJOR FOREST TYPES IN PENNSYLVANIA
1955



THE FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

The TIMBER RESOURCES of KENTUCKY

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U. S. FOREST SERVICE RESOURCE BULLETIN NE-9
1968

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

PREFACE

THE McSweeney-McNary Forest Research Act of 1928 authorizes the U. S. Forest Service to complete a statewide forest inventory of Kentucky at approximate 10-year intervals as part of the nationwide program of maintaining a current account of our timber resources. The Division of Forestry of the Kentucky Department of Natural Resources and the U. S. Forest Service planned and conducted a new inventory of Kentucky forests. The field work was completed in 1964.

Kentucky appropriated $120,000 for the survey. This contribution, supplementing the Federal funds available for a regular survey, made it possible to intensify the inventory. As a result, we can provide the detailed information needed for making long-range plans to meet future demands. This information will help local communities and forest-based industries use the forest resource more efficiently.

Clarence D. Chase of the North Central Forest Experiment Station directed the inventory. Field data were collected by men of the Kentucky Division of Forestry and the North Central Station under the supervision of Thomas E. Jordan, Jr. Arthur G. Horn compiled timber-cut and product data, and Burton L. Essex compiled forest inventory and growth information. Joseph E. Barnard and Paul S. DeBald of the Northeastern Forest Experiment Station assisted with statistical computations. Results were analyzed and reported by the Northeastern Station.

Personnel of the Eastern Region of the U. S. Forest Service inventoried and provided statistics for the Daniel Boone National Forest. The Tennessee Valley Authority provided men and equipment to assist in surveying areas of their interest. The Soil Conservation Service and the Agricultural Stabilization and Conservation Service provided the field crews with office space and up-to-date aerial photographs. The Kentucky Department of Highways took and provided aerial photographs for parts of eastern Kentucky for which no recent photographs were available. The University of Kentucky and the Kentucky Department of Commerce took an active part in planning the survey and gave valuable assistance with problems that came up during the inventory. Our thanks go to all these organizations.

Additional information about the survey can be obtained either from the Division of Forestry of the Kentucky Department of Natural Resources, or from the Northeastern Forest Experiment Station, Upper Darby, Pa.

COVER PHOTO: Cumberland Falls, Kentucky.

The TIMBER RESOURCES of KENTUCKY

by David A. Gansner

■

The Author

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Highlights

OVERALL, Kentucky's timber supply has not changed spectacularly since 1949. The gains in total forest area and total timber volume amounted to less than 5 percent. But significant shifts in timber size occurred. The volume in trees less than 17 inches d.b.h. increased, but the volume in larger trees declined sharply. High-quality volume of many of the State's important timber species continues to decrease.

This trend could be reversed. Volume in trees in the 12-to-16-inch d.b.h. classes increased substantially. Thus today there is a larger base of timber that could become high-grade material. If this immature but sound volume were managed, it would mature more quickly and would more than compensate for recent declines in high-quality volume.

A comparison of the desirable cut estimated for Kentucky with the harvest of growing stock for timber products recorded in 1962 shows that timber cutting could be expanded. Most of the surplus volume is in small and low-grade material that could be used for pulpwood, charcoal, and other products that do not have rigid size and log-quality standards.

Comparisons between the desirable cut and product cut show that, based on the physical supplies of timber, the greatest opportunities to expand forest-based industry are in the eastern part of the State.

Trends in Timber Use

TIMBER — AN IMPORTANT RESOURCE

Almost half of Kentucky's 26 million acres of land area is forested. Although these forests serve a number of uses, here we will consider them primarily as sources of timber for industrial use.

The contribution of timber-based activity in Kentucky is impressive. Forty thousand people were employed in timber-based economic activities in the State in 1958.[1] These activities include the management of forests; the harvesting, primary and secondary manufacturing, transporting and marketing of timber; and the use of timber in construction. In the same year, the estimated value added by these activities was about $220 million or 40 percent more than in 1954 (fig. 1).

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[1] Hair, Dwight. THE ECONOMIC IMPORTANCE OF TIMBER IN THE U. S. U. S. Dep. Agr. Misc. Pub. 941, 91 pp., illus. 1963.

Figure 1.—Timber, a vital raw material.

Although significant, these figures, when compared with those of other states, point out a greater potential. For example, of the seven states that border Kentucky, only Virginia and Tennessee harvest more timber. Yet the total value added in timber-based economic activity in Kentucky exceeds that in only one of these border states—West Virginia.

The reason is simple. Kentucky has fewer wood-processing firms, does less transporting and marketing of timber products, and ranks lower in wood construction.

WOOD USE

Wood Use Totaled 137 Million Cubic Feet in 1962

Total wood use has declined in Kentucky since 1948. About 137 million cubic feet of Kentucky wood was used for timber products in 1962—34 percent less than in 1948. Some 650 processors of rough logs and bolts are now active in the State (figs. 2 and 3)—about one-third the total operating at the time of the last inventory. Value of the 1962 output at point of first sale—primary wood-using plants, timber dealers, and other local points of delivery—was about $30 million.

A comparison of Kentucky wood output by products—1948 and 1962—is shown below:

Product	*Unit of measure*	*1948*	*1962*	*Change (percent)*
Sawlogs	M board feet[1]	508,240	460,380	—9
Veneer logs	M board feet[1]	9,614	12,455	+30
Cooperage logs	M board feet[1]	44,042	21,017	—52
Pulpwood	Standard cords[2]	47,225	82,165	+74
Fuelwood	Standard cords[2]	1,506,000	680,000	—55
Fence posts	M pieces	13,544	3,600	—73
Mine timbers	M cubic feet	16,497	4,336	—74
Other[3]	M cubic feet	4,006	3,401	—15
All products	M cubic feet	208,122	137,393	—34

[1] International ¼-inch rule.

[2] Rough wood basis.

[3] Includes charcoal wood, poles and piling, handle logs, and other miscellaneous industrial wood.

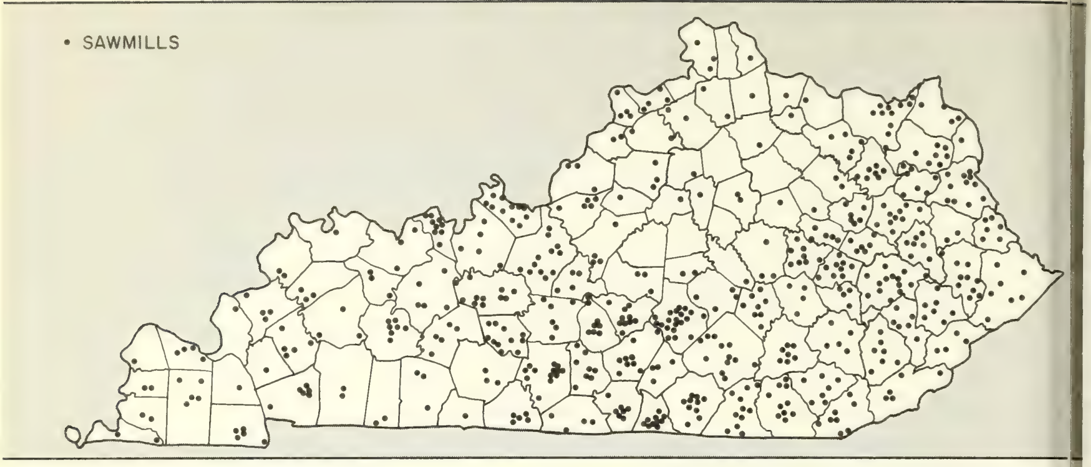
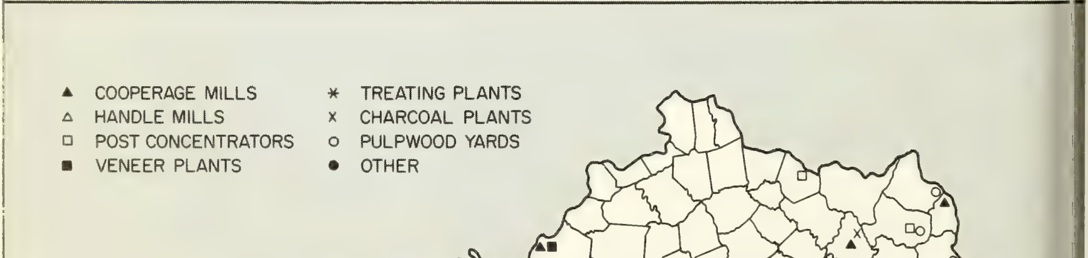


Figure 2.—Location of Kentucky's sawmills. Source: Primary wood industries of Kentucky.

Figure 3.—Location of Kentucky's other primary wood-using industries, 1963. Source: Primary wood industries of Kentucky.



Lumber Logs — Kentucky's Main Forest Product

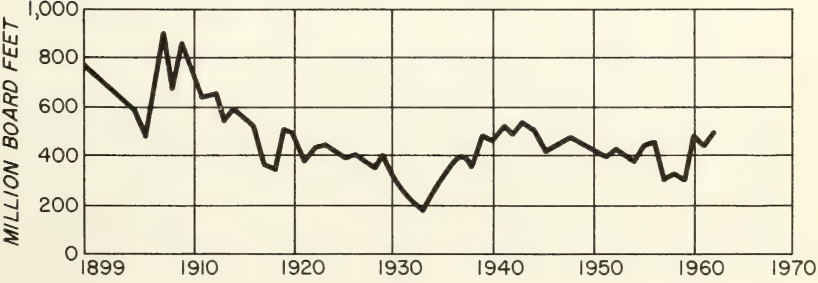
More Kentucky wood is used for lumber and lumber items than for any other product. In 1962, 460 million board feet of sawlogs was harvested, and 466 million board feet of lumber was produced by local mills.

Annual lumber production has ranged from nearly 1 billion board feet at the turn of the century to 200 million board feet during the depression (fig. 4). Modern highs of more than 500 million board feet per year were recorded during World War II. In the last decade, production has fluctuated between 300 and 500 million board feet; the lowest production occurred in 1957-59.

The oaks have remained the most important lumber species. About 45 percent of the lumber produced in 1962 was oak; yellow-poplar and beech ranked next. Softwood lumber production amounted to only about 25 million board feet, and shortleaf pine accounted for just about half of this total.

Kentucky's lumber industry has changed appreciably since the last survey. More mills were operating in 1948, but most of them were small and portable, and few provided dependable year-long employment. Today the mills are larger and the industry has become more permanent. Only a handful of the 2,000 mills that were operating in 1948 each produced more than a million board feet of lumber annually. In 1962 more than 100 mills (about

Figure 4.—Lumber production in Kentucky, 1899-1962. Sources: Steer, Henry. Lumber production in the United States, 1799-1946, U. S. Dep. Agr. Misc. Pub. 669, 233 pp. 1948; and lumber production statistics published by the U. S. Dep. Commerce.



one-fifth of those operating) produced at least this much lumber, and a few produced more than 5 million board feet. Average annual production was about 800,000 board feet per mill in 1962 compared with 250,000 board feet in 1948.

Use of Fuelwood, Cooperage Logs, Mine Timbers, and Fence Posts Declines Sharply

At the time of the last forest inventory fuelwood accounted for almost half of the total wood production. But the 680 thousand cords of fuelwood used in 1962 was less than half the amount of fuelwood used in 1948. In those days wood was still used extensively for heating and cooking. But fuelwood is becoming a luxury item used primarily in residential fireplaces. Oil, gas, and coal have rapidly replaced wood in the factory and in the home.

Because new technology, changes in consumer buying, and new packaging techniques have reduced the demand for cooperage, the production of cooperage logs and bolts has declined significantly. In 1948, 87 cooperage mills were operating in Kentucky. Now there are one-third as many mills. The State produced 44 million board feet of cooperage logs and bolts in 1948. The output of cooperage logs in 1962 and 1964 was about half of that.

Practically all the volume produced today is white oak that goes to local stave and heading mills where it is sawed into stock for bourbon barrels. Some timber is cut in Kentucky for slack cooperage. All of it is shipped to a mill in an adjacent state.

Despite declines in production, Kentucky still ranks with Missouri, Illinois, Tennessee, and Arkansas as one of the leaders in the production of cooperage logs (fig. 5).

Because mining practices have changed, the use of wood in mining has declined sharply in the last decade. The 4.3 million cubic feet of wooden mine materials produced in Kentucky in 1962 was only one-fourth of the 1948 total. Conveyor belt systems and rubber-tired vehicles have been replacing rail cars, thereby reducing the need for mine ties. Steel arches and metal roof bolts are being used instead of mine props. Also, the ex-

Figure 5.—Kentucky still ranks among the Nation's leading States in the production of cooperage.

tended use of wood preservatives has lengthened the service life of mine timbers.

Fence-post production is down substantially. Kentucky produced only 3.6 million fence posts in 1962 compared to 13.5 million in 1948. Greater and more efficient use of preservatives has made wooden fence posts more durable, and steel and other materials have been substituted for wood. Changes in farming methods have also lessened the need for fence posts.

Pulpwood, Charcoal, and Veneer Log Production Is Up

As of 1963 Kentucky had no pulpmills, yet pulpwood production between surveys increased more than the production for any other major forest product. The 82 thousand cords of pulpwood produced in 1962 was 74 percent more than in 1948.

Chipped slabs, edgings, and similar byproducts from sawmills and other wood-using plants continue to make up an ever-increasing share of the total pulpwood output. But roundwood logs still make up most of the total output. The harvest of roundwood in Kentucky averaged less than 50 thousand cords per year in the 1950's but has increased to more than 70 thousand cords per year in the 1960's. The harvest of pine pulpwood has increased recently. In 1948, very little pine pulpwood was cut; now pine represents more than half of the total harvest.

The charcoal industry in Kentucky was relatively unimportant in 1948 and through the early 1960's. But, as the needs of outdoor chefs and industrial users grew, Kentucky rapidly became one of the Nation's leading charcoal producers. Expansion has been recent. In fact, most of the growth took place after the timber-utilization data used in this report were gathered. In 1961 three plants in Kentucky were producing charcoal. The industry used about 20,000 cords of wood and produced 8,000 tons of bulk charcoal. Six plants are active now; and production has increased several-fold.

There are half as many veneer plants in the State now as in 1948, yet the annual harvest of veneer logs has increased about 30 percent. Production is up primarily because shipments of veneer logs to adjacent states and foreign ports increased. In 1948 less than 4 of the 9.6 million board feet of veneer logs harvested from Kentucky was sent to mills outside the State. About 8 of the 12.4 million board feet produced in 1962 was sent outside the State. Only one-third of the 1962 veneer log output was container material. The production of container veneer logs, used in the manufacture of baskets and crates, has slackened because substitute materials like fiberboard and plastic have claimed larger shares of this market. But this decline was more than offset by increased harvests of face and commercial veneer logs for high-grade plywood panels and furniture stock.

Black walnut is now the species most heavily used for veneer logs. In 1948 less than a million board feet or 10 percent of the production was walnut. The 5 million board feet of walnut veneer logs harvested in 1962 represented about 40 percent of that year's total production. Yellow-poplar and cottonwood rank next to black walnut as important veneer species.

Harvest of Growing Stock for Timber Products Exceeds 120 Million Cubic Feet

About 123 million cubic feet of growing-stock volume was cut for timber products in 1962.[2] (Relationships of timber supply and demand ordinarily are expressed in terms of growing stock because this kind of timber is suitable, under present standards, for pulpwood, sawlogs, and other industrial products.)

Not all of the 123 million cubic-foot harvest was utilized for products. Some 19 million cubic feet of it was left in the woods as residue. Logging waste is generally greater for products with rigid quality specifications and where logging for more than one product is not practiced. For example, about 45 percent of the sound growing stock felled for use as handle stock went unused in 1962. Most Kentucky handle stock comes from hickory, a species with few alternative commercial outlets. Loggers concentrate on cutting straight, clear bolts for this one product; and sound timber that does not meet the size and quality standards for handle stock is left in the woods.

The 104 million cubic feet of growing stock used for products accounted for three-fourths of Kentucky's total output of wood for timber products in 1962. The remaining output (33 million cubic feet) came from non-growing stock sources like limbwood; cull, dead, and sapling-size trees; noncommercial forest land; and plant byproducts. Nongrowing-stock material was used mainly for fuelwood, which does not require wood of growing-stock quality.

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[2] The timber harvest reported here does not represent the total amount of volume removed from commercial forest land (see table 43). For example, some timber was pushed and burned in land-clearing and strip-mining. Also, some tracts that retained their tree cover were set aside as parks, flooded by new reservoirs, developed for pasture, or converted to some other non-commercial forest or nonforest use. The 1963 forest inventory did not measure such losses or shifts in commercial forest area and timber volume.

Most of the Cut from Trees of Sawtimber Size

Four-fifths of the total growing stock cut for products in 1962 was from sawtimber-size trees. More than half of the total harvest came from trees 15.0 inches to 24.9 inches d.b.h. Included in the 1962 cut of growing stock were 632 million board feet of sawlog size material.

The 25 million cubic feet of poletimber volume harvested in 1962 was less than half of the 1948 total. The volume of poletimber used for pulpwood has increased steadily. But this gain has been more than offset by sharp declines in the production of fuelwood, fence posts, and mine timbers—products that accounted for the greatest drain on poletimber at the time of the last survey.

Almost half of the 1962 cut was from oaks, the most plentiful species in the State. Yellow-poplar, hickory, beech, and shortleaf pine followed in order of importance and accounted for another 30 percent of the total.

The 1962 harvest of growing stock for timber products represented less than 2 percent of Kentucky's total inventory. It averaged about 10 cubic feet of growing stock and 50 board feet of sawtimber volume per commercial forest acre. Cutting was heaviest in the Western Coalfield unit where many of Kentucky's largest sawmills are found. Per-acre cutting rates in this region are just about double the averages for the whole State.

Trends In The Timber Supply

FOREST AREA

A Slight Increase in Commercial Forest Area

Not all of Kentucky's 11.9 million acres of forest land is commercial forest land. Some 81,000 acres is forest reserved from cutting like that in Mammoth Cave National Park. Another 62,000 acres is woodland on sites too poor to produce industrial

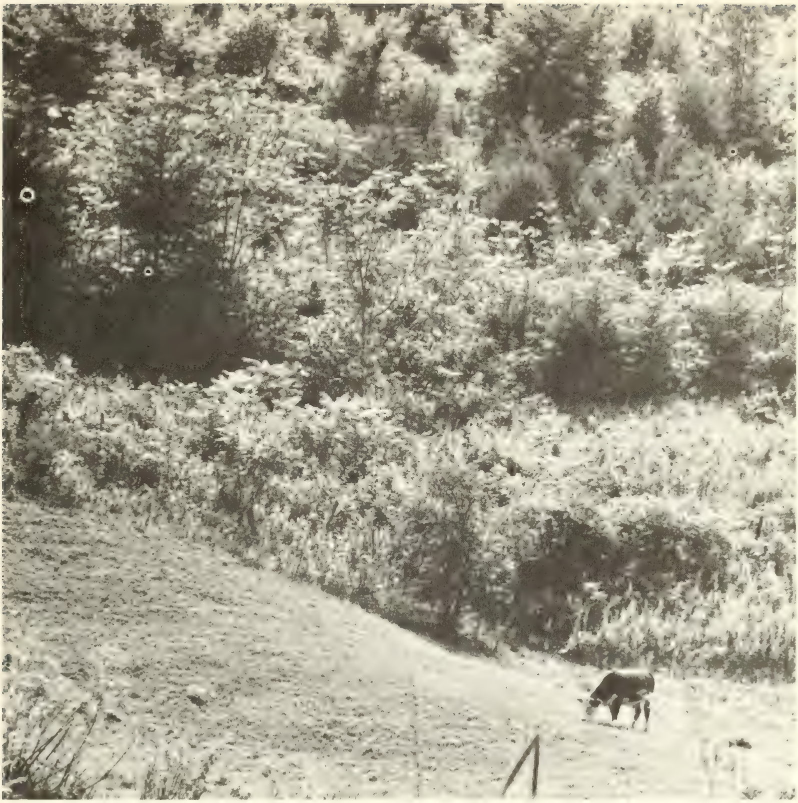


Figure 6.—Many acres of abandoned submarginal farm land are coming back into brushy forest cover.

timber. This leaves 11,712,800 acres of commercial forest land —2.3 percent more than in 1949.

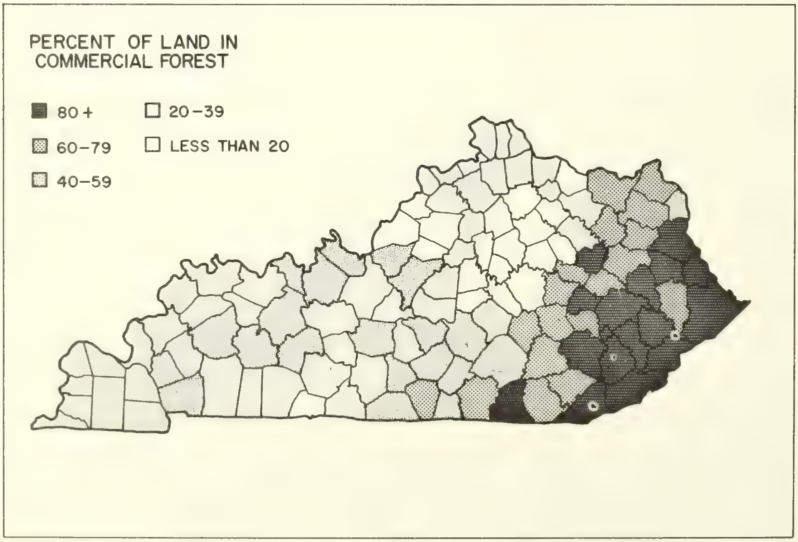
The rather small overall gain in commercial forest area between surveys does not reflect some of the important shifts at local levels. Forest area increased significantly in the Cumberland Mountain and Western Coalfield regions of the State where many abandoned submarginal fields and pastures have, through planting and natural regeneration, become restocked with trees. Much of this new forest is in a brushy transitional stage of development and will not become stocked with merchantable timber for some time (fig. 6). Forest area declined most in the Bluegrass Region. In this region, which is already the least forested and most highly developed area of Kentucky, woodland continues to give way to agriculture, industry, and urbanization. Changes in the survey units of the State were:

Survey unit	*Commercial forest in 1963 (thousand acres)*	*Change from 1949 (percent)*
Western	721	(*)
Western Coalfield	1,843	+5
Pennyroyal	2,167	+3
Bluegrass	1,128	—8
Northern Cumberland	1,858	+6
Southern Cumberland	2,201	+5
Eastern	1,795	(*)
Total	11,713	+2

*Insignificant.

The Eastern Unit is the most heavily forested. Here commercial forest occupies 84 percent of the land area, and no county is less than 74 percent forested. At the other extreme is the Bluegrass Region where only one-fifth of the total land area is in woodland, and counties less than 15 percent forested are common (fig. 7).

Figure 7.—Percent of land forested, by counties, 1963.



Hardwood Types Predominate

Two hardwood types—oak-hickory and central mixed hardwoods—account for three-fourths of the commercial forest land. In the rough highlands of extreme eastern Kentucky, nine-tenths of the forest cover is in these types. The species composition changes somewhat further west. In the Cumberland region, these types still predominate but stands of oak mixed with pine occur more frequently. In central Kentucky stands of hardwood mixed with red cedar are common, especially on drier sites. And in the extreme western part of the State, where the topography begins to level off and stream valleys become wider, bottomland hardwood species like elm, cottonwood, and sweetgum begin to show up in greater abundance. For example, in the 11-county Western unit elm-ash-cottonwood forests and oak-gum-cypress forests represent almost one-third of the total commercial woodland.

Stands in which softwoods are a major component of the stocking represent less than 5 percent of the total commercial forest area. This is not to say the softwood resource is unimportant. Quite to the contrary; where they are found, softwoods contribute significantly to local timber economies. For example, in the southern Cumberland unit, the harvest of shortleaf pine volume alone exceeds that of any other individual species.

Little Change in Ownership Pattern

The ownership situation in Kentucky has not changed appreciably since the last survey.

Forest area in private ownership has increased by 200,000 acres or 2 percent, but still accounts for 94 percent of the total commercial forest land (fig. 8). People or companies operating wood-using plants own about 2 percent of the privately owned forest. These people are familiar with the timber resource and are at least aware of the results of sound forestry.

A plurality of the private forest is owned by some 200,000 people with small holdings (few of their tracts are larger than 100 acres) who are not actively interested in forest management.

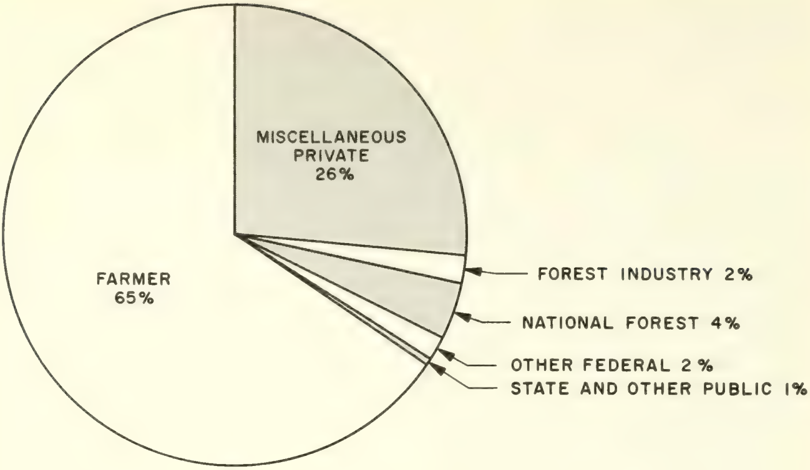


Figure 8.—Distribution of commercial forest area by ownership class, 1963.

Because they own such a large share of the woodland, how they treat their land today primarily will determine how the forest resources of Kentucky will develop in the future.

Forest area in public ownership has increased by 66,000 acres or 10 percent. Much of Kentucky's 742,000 acres of publicly owned commercial forest is under some form of management aimed at sustained yield production. Some 453,000 acres of it is in the Daniel Boone National Forest, administered by the Forest Service. The Forest Service, by planting, purchase, and exchange, has added 47,000 acres of commercial forest to the Daniel Boone since 1949. The State of Kentucky owns 77,000 acres of commercial forest—24,000 acres more than at the time of the first survey. Some 47,000 acres of this woodland is in state forests administered by the Kentucky Division of Forestry. The remaining publicly owned forest is in Army installations, wildlife refuges, and other Federal, state, county, and municipal holdings.

TIMBER VOLUME

Between inventories, growing-stock volume increased 4 percent,[3] an average rate of about 20 million cubic feet per year. Sawtimber volume increased 6 percent, about 105 million board feet per year.

Average Size of Timber Smaller

Since 1949 the volume of small timber increased while the volume of big timber declined. The volume of growing-stock trees less than 17 inches d.b.h. increased 625 million cubic feet or 12 percent; the most impressive gains took place on trees in the 11.0 to 16.9 inch d.b.h. classes. But the volume in trees 17 inches d.b.h. and larger declined 331 million cubic feet or 18 percent (fig. 9). Improvements in forest protection have been primarily responsible for substantial boosts in the numbers and volume of small trees.

The size distribution of sawtimber has changed, also. The volume of sawlog material in trees less than 17 inches d.b.h. increased 21 percent. But the volume in larger trees—the size preferred by most of the local sawmills, cooperage mills, and other primary wood-using industries—declined 12 percent:

	1949		*1963*		*Change*	
Diameter class (inches)	*(Million board feet)*	*(Percent of total)*	*(Million board feet)*	*(Percent of total)*	*(Million board feet)*	*(Percent)*
Less than 16.9	13,657	55	16,499	63	+2,842	+21
17.0 and larger	10,998	45	9,649	37	—1,349	—12
Total	24,655	100	26,148	100	+1,493	+6

Regional Changes in Volume

Changes in sawtimber volume were not distributed proportionately across the State. Noteworthy gains occurred in the Northern Cumberland and Western units where growth has

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[3] The 1949 estimates of growing-stock volume are not directly comparable with those of 1963 because they did not include merchantable material in the upper-stem portion of hardwood sawtimber-size trees. The 1949 data had to be adjusted to permit comparisons.

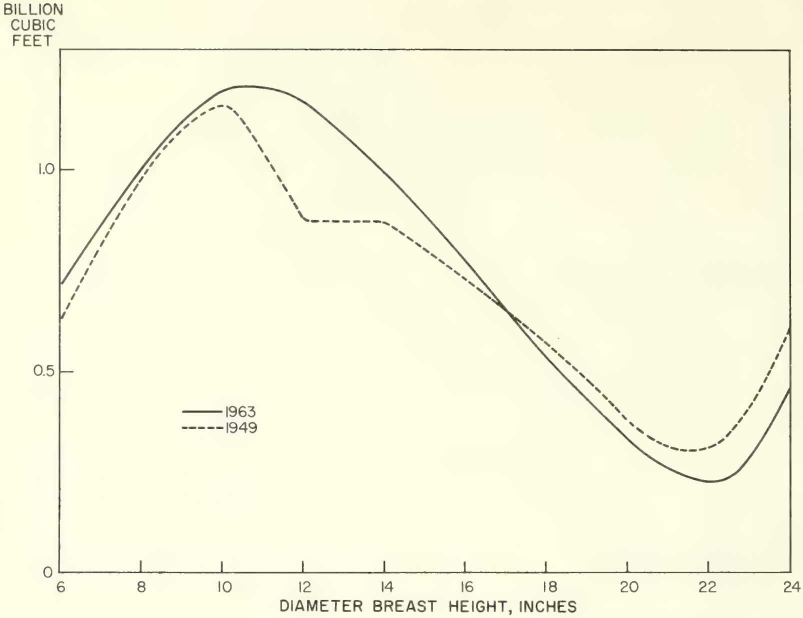


Figure 9.—Change in growing-stock volume by diameter classes between 1949 and 1963.

exceeded cut for nearly all sizes of timber in recent years. Volume in the Eastern and Bluegrass survey units declined significantly. Shifts in land use and timber harvesting have reduced forest acreage and average forest stocking in both of the latter areas.

The distribution of sawtimber volume and changes in each of the seven survey units of the State since 1949 are shown below:

Survey unit	*Sawtimber volume in 1963 (million board feet)*	*Change from 1949 (percent)*
Western	2,611	+54
Western Coalfield	4,234	+13
Pennyroyal	4,179	—3
Bluegrass	1,045	—18
Northern Cumbeland	3,935	+47
Southern Cumberland	5,098	+4
Eastern	5,046	—16
Total	26,148	+6

More Oak and Yellow-Poplar — Less Beech and Black Walnut

The species composition of Kentucky's forests has changed somewhat since 1949. Volumes of oak, hickory, yellow-poplar, and maple—all heavily used timber species—have increased.

Yellow-poplar made the most impressive gain (fig. 10). This species, which is quick to occupy cut-over areas and has been favored in most cultural operations, grows fast once it becomes

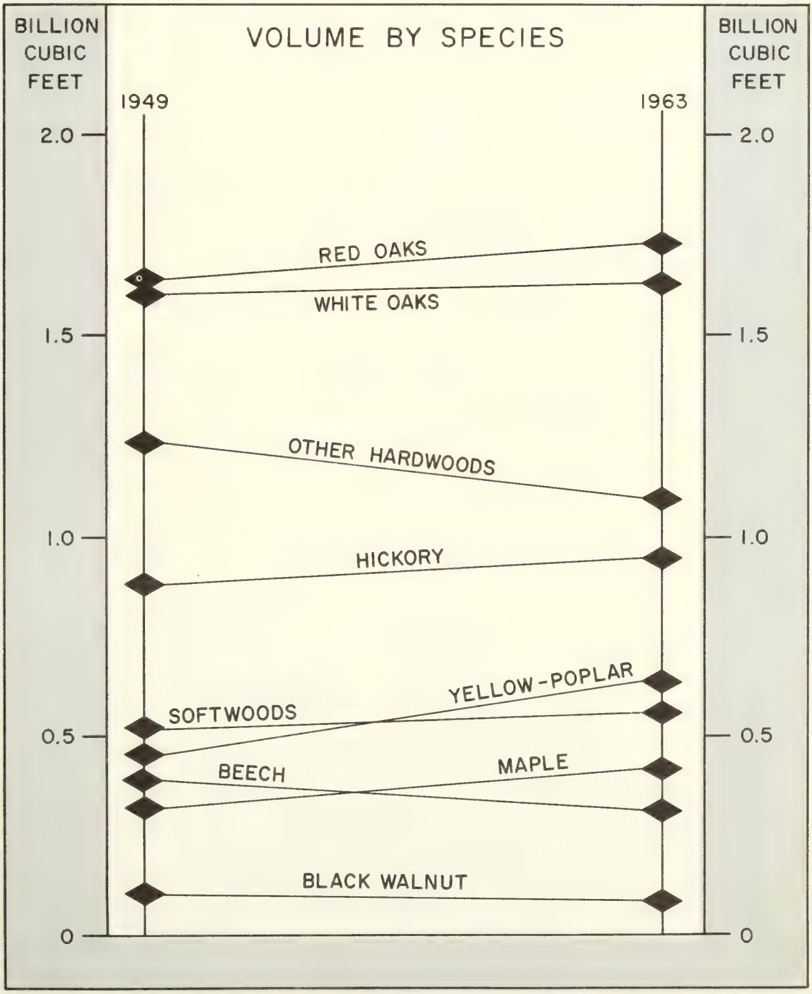


Figure 10.—Change in growing-stock volume by species groups, 1949-1963.

established. There is now almost half again as much yellow-poplar growing-stock volume in Kentucky as there was in 1949. Despite heavy cutting, the volume of yellow-poplar sawtimber also has increased substantially and now exceeds that of beech (fig. 11).

At the same time heavy cutting has led to sharp reductions in the volume of beech. The volume of beech timber, which ranks behind only the oaks, hickory, and yellow-poplar in total

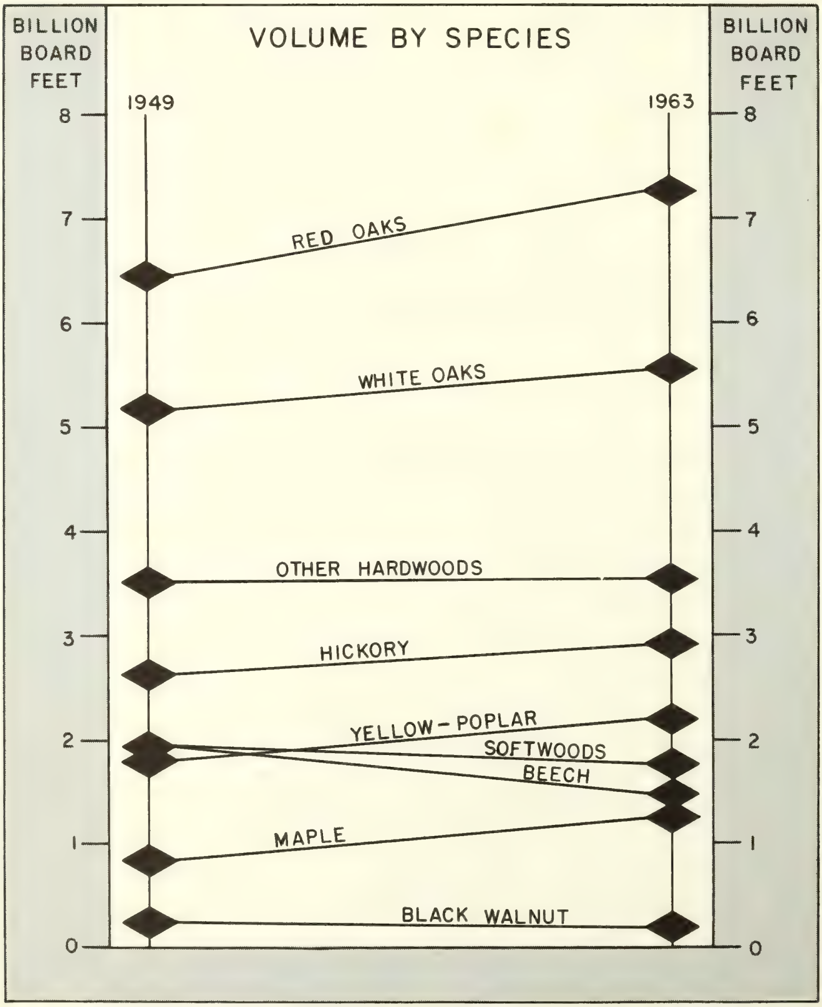


Figure 11. — Change in sawtimber volume by species groups, 1949-1963.

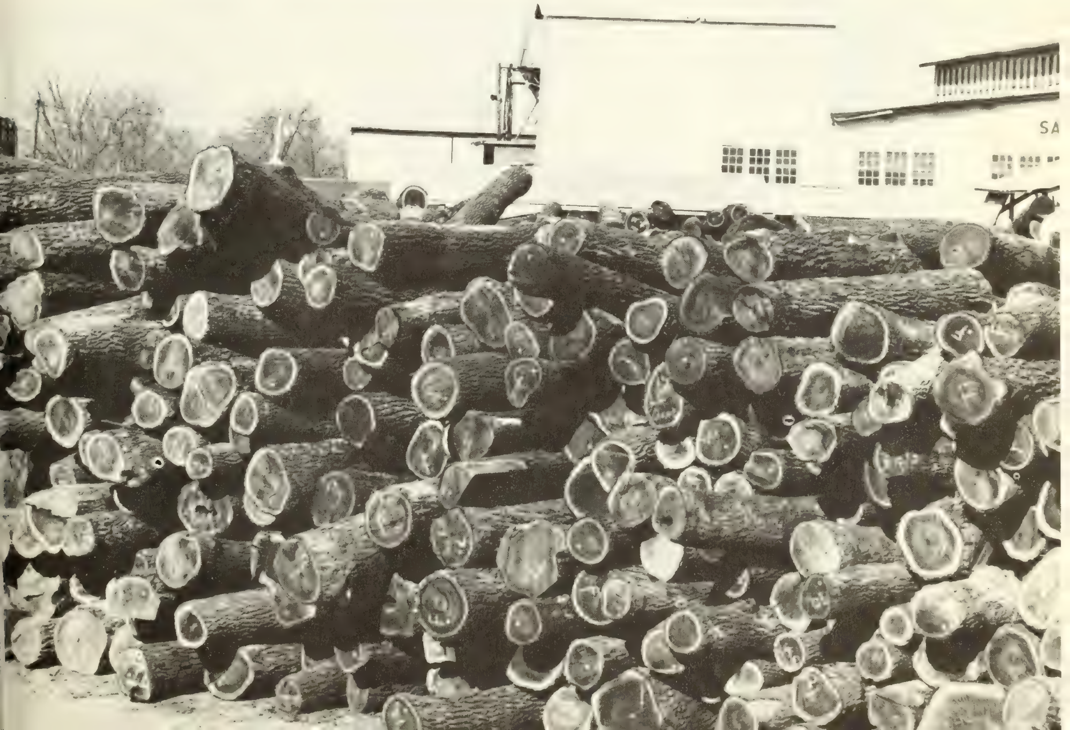
use, is down more than 20 percent; and beech continues to be cut at a faster rate than it is growing.

The volume of black walnut on commercial forest land has been reduced about 30 percent (fig. 12). Much of Kentucky's black walnut volume was not tallied because it grows in fence rows, pastures, and other nonforest areas. A special survey has estimated the walnut volume on nonforested lands at approximately 20 million cubic feet, including some 60 million board feet of sawlog material. This is almost one-third as much walnut volume as that found on all commercial forest land in Kentucky.

About half of the State's nonforest walnut is in the sparsely forested Bluegrass region. This means that the volume of black walnut on nonforest holdings in the Bluegrass is as great as the amount growing in its commercial woodlands.

The inventory of softwoods is up, but only because the volumes of Virginia pine and pitch pine increased sharply. The sawtimber volume of shortleaf pine, Kentucky's most important

Figure 12.—Black walnut supplies have dwindled rapidly because cutting has been excessive.



softwood species in terms of utilization, has been reduced almost 30 percent. Shortleaf pine accounted for one-half of the total softwood sawtimber volume in 1949, but it accounted for less than 40 percent of the 1963 total. The volume and numbers of small shortleaf pine trees (less than 11 inches d.b.h.) increased greatly between surveys, but this increase was more than offset by cutting and mortality in larger timber. The end result was an overall decline in all shortleaf pine growing stock.

With all these changes in volume, the average stocking in Kentucky's forests improved. On the average, volume is up approximately 10 cubic feet of growing stock and 80 board feet of sawtimber per commercial forest acre.

There are also some 270 million cubic feet of non-growing-stock material in Kentucky's commercial forests (fig. 13). This is sound volume in cull and dead trees. Much of it is small and/or low-quality timber that would hardly be worth the cost of recovery for most industrial products, but it can be used for fuelwood, charcoal, and pulpwood chips. Because this material is undesirable, it can be used immediately; the removal of any of it from the forest would lead to net improvements in forest productivity.

Fewer High-Grade Sawlogs But Quality Potential Greater

Because so much of the timber harvested in Kentucky is used for sawlogs, veneer logs, cooperage bolts, and other products that demand large, straight, and relatively clear logs, higher quality logs are in great demand.

Because log size mainly determines log quality, the sharp declines in big timber indicate there are fewer high-quality sawlogs in Kentucky's commercial forests now than in 1949. This is true for nearly all the important timber species—the oaks, yellow-poplar, beech, black walnut, and shortleaf pine. Even so, a relatively high proportion of the State's volume is still in large, high-quality stock. Almost two-fifths of the total sawtimber volume is in trees 17 inches d.b.h. and larger, and 12 percent of the total is in trees over 23 inches d.b.h.

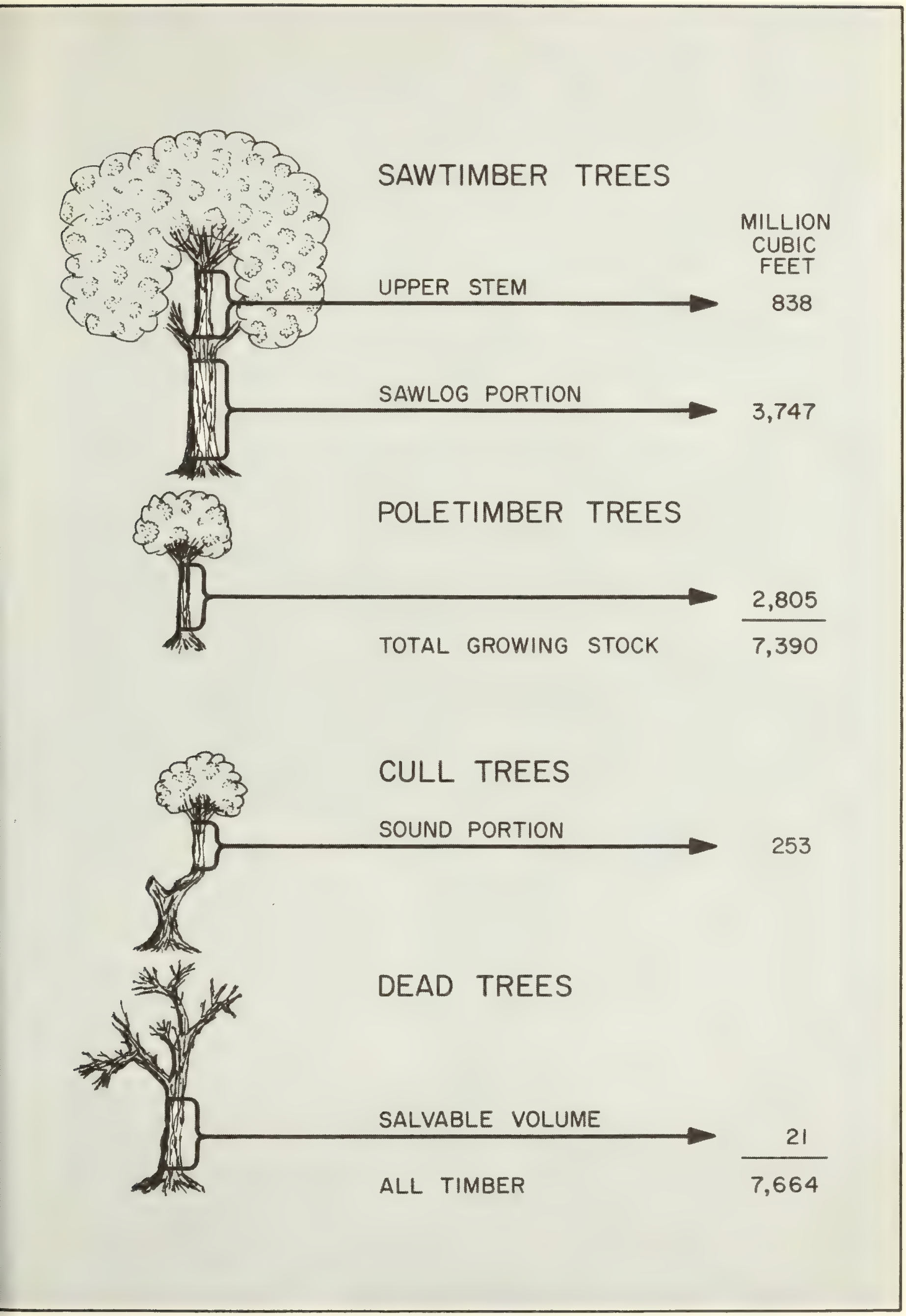


Figure 13.—Distribution of all timber on commercial forest land by kind of material, 1963.

A special log-grade study to evaluate the quality of Kentucky's timber supply showed that more than 10 billion board feet or two-fifths of the standing sawlog volume is log grade 2 or better quality and nearly half of this is grade-1 material (fig. 14). This is the timber that yields standard lumber, cooperage, veneer, handle stock, and other high-grade industrial products. Current harvests of this volume from Kentucky are about 400 million board feet annually. So, even if no growth occurred, the present inventory of grade-1 and grade-2 logs would be enough to satisfy current cutting rates for 20 to 30 years.

Perhaps no trend carries more import for Kentucky's timber economy than the sharp volume increases in trees in the 12- to 16-inch d.b.h. classes (fig. 15). Much of this volume is classified log grade 3 but only because it is smaller than the minimum size required for the higher grades. If these immature but sound trees were managed they would mature more quickly and would more than compensate for the recent declines in large sawtimber.

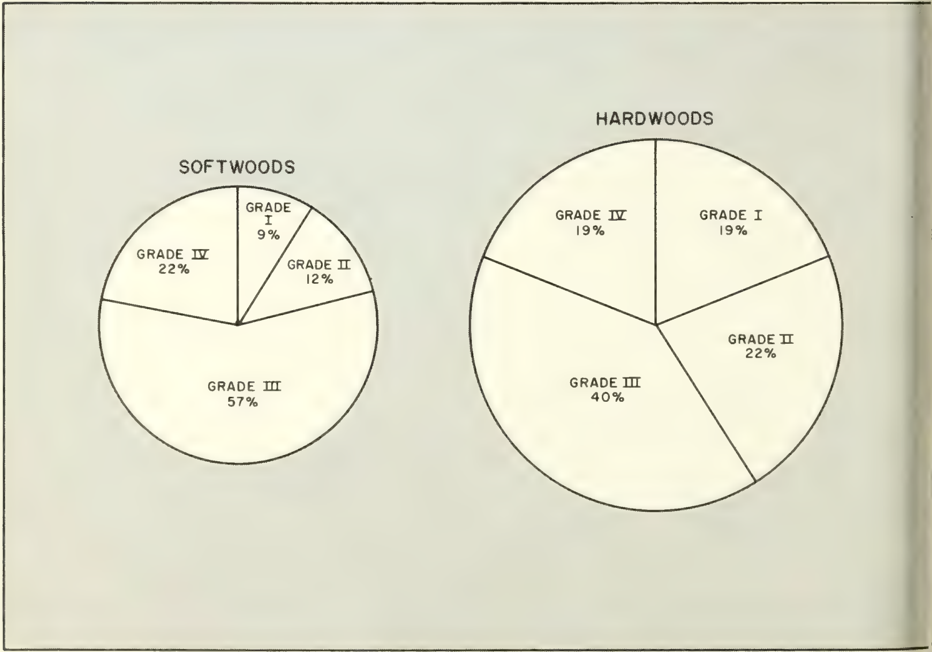


Figure 14. — Distribution of sawtimber volume by log grades, 1963.

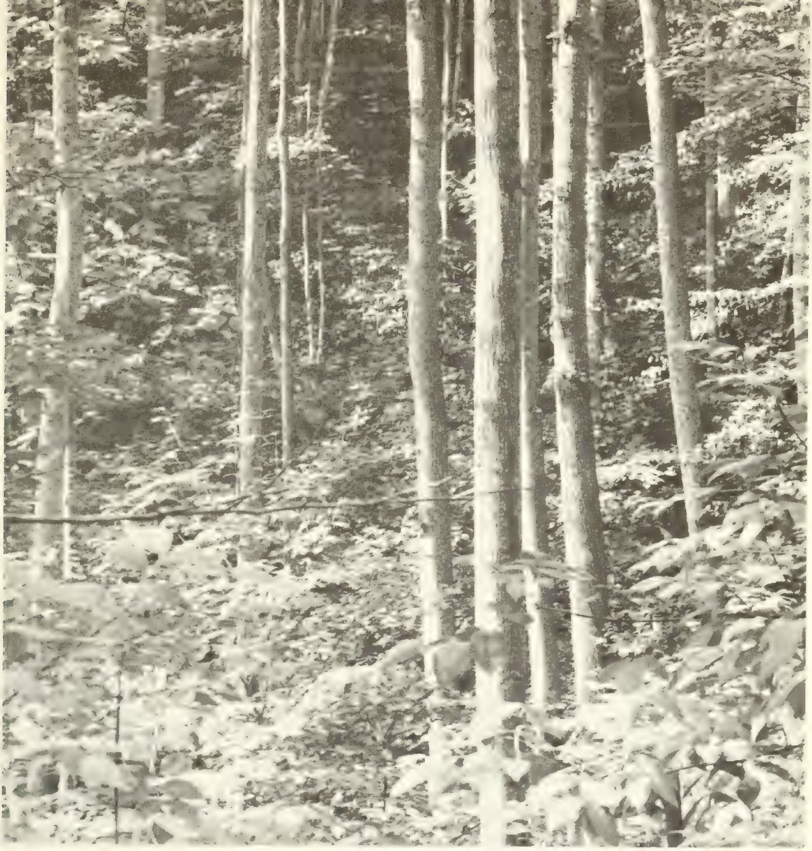


Figure 15.—Volume of immature trees with high-quality potential has increased sharply.

This timber also offers an excellent opportunity for large and timely returns per dollar invested in forestry. Its development should be a matter of prime concern to Kentucky's forest managers.

Productivity is Below Potential But Timber Supply is Increasing

Kentucky's productivity is below its potential. Nine-tenths of the timberland in Kentucky can produce more than 50 cubic feet per acre per year, and more than half of it can produce more than 85 cubic feet per acre per year (potential expressed in mean annual growth at culmination of increment in fully stocked stands of desirable trees). Current production averages are well below this. Substantial increases in productivity and quality will not take place until stocking improves. Poor growing stock and culls are occupying space that could be growing thrifty crop trees (fig. 16). Only 38 percent of the total commercial forest is now well stocked with merchantable or potentially merchantable trees. And only 14 percent is well stocked with desirable growing-stock trees or is expected to attain this stocking without treatment in the near future. An average of one out of every seven live trees of merchantable size (5 inches and larger) is too rough or rotten to be used for industrial products.

Figure 16. — Opportunities for improving stocking and timber productivity are evident in stands like this throughout the State.

Natural mortality also depresses timber growth. Fire, insects, diseases, and other agents were killing timber at an estimated rate of about 14 million cubic feet of growing stock per year in 1962. Thus total mortality amounts to a volume loss that is greater than the harvests of some of Kentucky's most important timber species.

Even though productivity is lower than it might be, volume is increasing.

The best measure of current volume change is the average of volume change that occurred between 1949 and 1963. The 1963 inventory did not measure some important components of inventory change. For example, since 1949 many acres of land have shifted into and out of the commercial forest category. Merchantable volume got pushed and burned in the clearing of land for farms, cities, and highways. Also, some tracts of standing timber were set aside for state and roadside parks or became converted to other nonforest or non-commercial uses. At the same time wooded pastures and other nonforest holdings were left idle, suddenly to become part of the commercial forest resource again.

Between inventories growing-stock volume increased at an average rate of about 20 million cubic feet per year. Sawtimber volume increased about 105 million board feet per year. These average rates incorporate all components of volume change (increment and removal) between inventories.

Desirable Cut and the Timber Balance

DESIRABLE CUT

A desirable cut of 196 million cubic feet of growing-stock, including 809 million board feet of sawtimber, has been computed for Kentucky.

A desirable cut represents the volume of merchantable timber that can be harvested annually in the next decade while a healthy balance of age classes is established and maintained and the productivity of the State's forests is improved.

The long range goal of the desirable cut is to establish a regulated forest producing a sustained yield of timber. Desirable cut, then, is calculated chiefly from a silvicultural viewpoint—what is good for the stand in the long run. Such goals are not always compatible with those of forest industries and woodland owners seeking immediate profits or of small communities striving for rapid economic development. For example, a Kentucky mill operator competing for a steady supply of quality raw material would hesitate to reduce the utilization of high-grade logs for the sake of long-range improvements in forest productivity. At the same time, a small woodland owner would be reluctant to invest in stand-improvement cuttings if he had no markets for the timber cut or no promise of a return on his investment in the near future.

Despite its shortcomings, the desirable cut has practical application. It provides a silvicultural standard that can be compared with current cutting to indicate generally where shortages and surpluses occur in the timber supply. And, because it is based on current management objectives, the desirable cut provides a more meaningful way to gage timber excesses and deficits than simple comparisons between growth and cut.

MORE TIMBER COULD BE HARVESTED

Comparisons between desirable cut and product cut indicate that more timber could be harvested from Kentucky. The estimated desirable cut of growing stock exceeds the volume cut for timber products in 1962 by about 70 million cubic feet (fig. 17). However the degree of available surplus is not the same for all species and sizes of timber, and the surplus also varies for different regions of the state.

Comparisons between desirable cut and product cut show a large surplus of poletimber volume—material that can be used for pulpwood, charcoal, particle board, and other products that do not have rigid size and log-quality standards. Based on the available wood supplies, the opportunities for expanding industries that use this kind of timber appear excellent, and the addition or expansion of any such firms would benefit both the

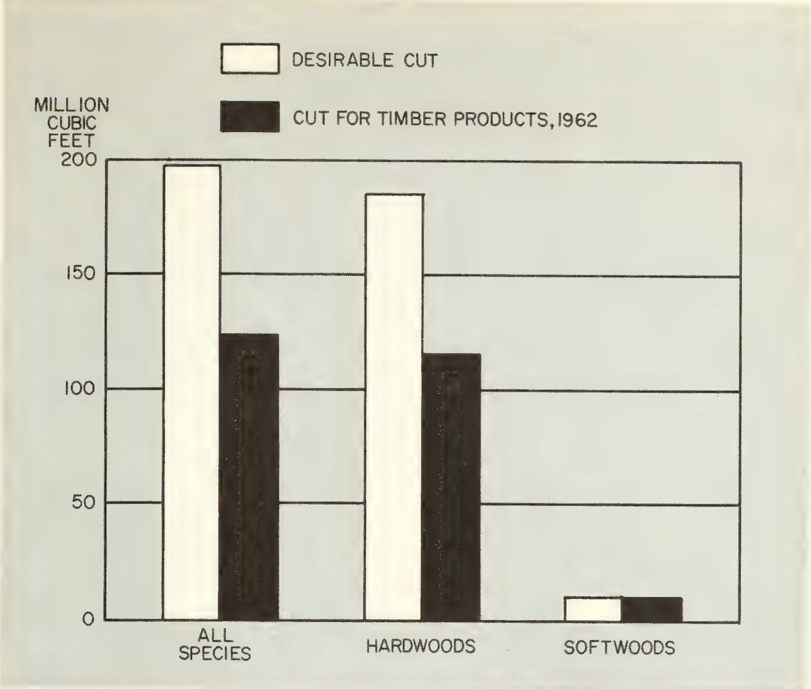


Figure 17.—Comparison of the desirable cut of growing stock with that actually cut for timber products in 1962 for major species groups.

timber resource and the local economy (fig. 18). The desirable cut of sawlog material also exceeds the actual cut but by a lesser amount.

The desirable cut of sawtimber volume is about 180 million board feet greater than the amount cut for products in 1962. Indications are that sawtimber harvests could be increased for most of Kentucky's important timber species (fig. 19). The surpluses of oak and hickory alone could support several new wood-using establishments. Shortleaf pine, maple, ash, and blackgum also could sustain additional cutting.

But a few important species are being cut too heavily and deficits are greatest in the larger diameter classes where high quality is concentrated. Excessive cutting of immature high-grade black walnut is particularly alarming, and if the trend continues supplies of this valuable timber may soon be depleted. Yellow-

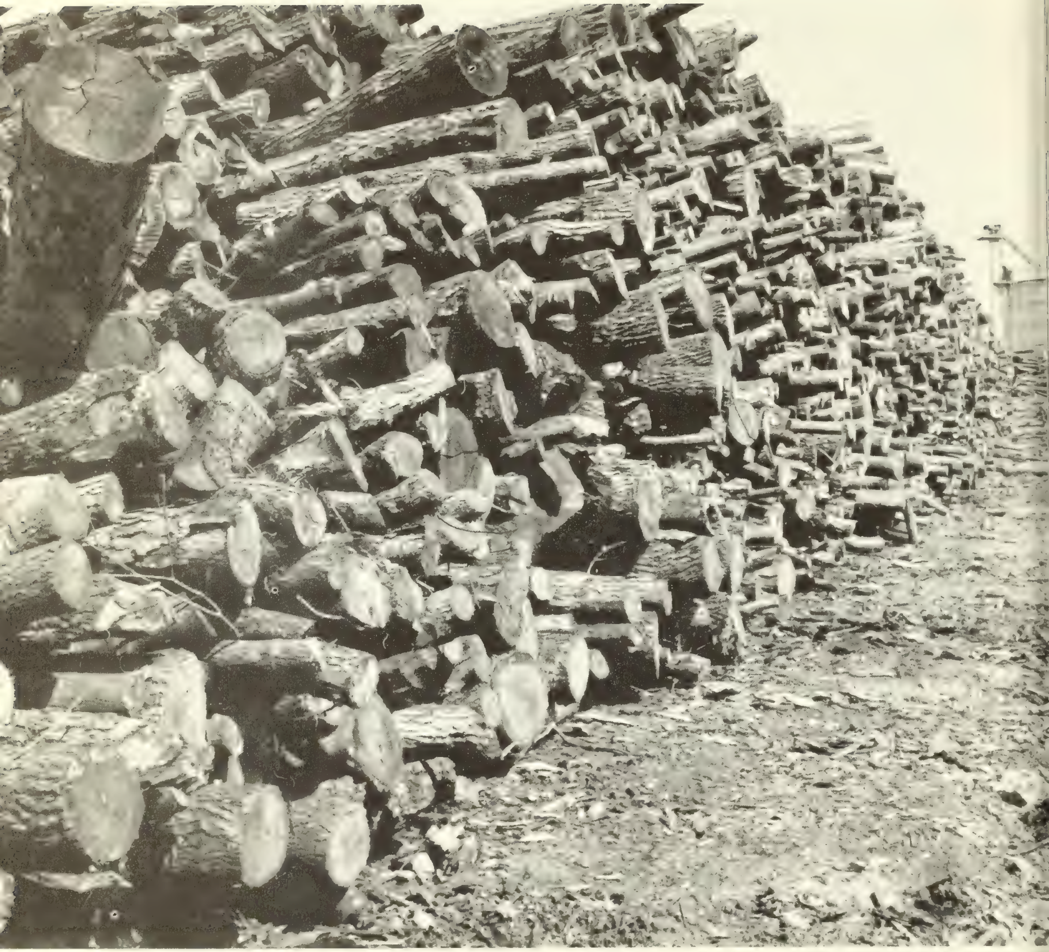


Figure 18.—A large surplus of small and low grade timber is available for cutting.

poplar sawtimber also is being overcut even though this volume is increasing rapidly. Most of the increment in yellow-poplar sawtimber is on small trees that are not ready for harvest.

Markets, transportation systems, labor supplies, tax structures, incentive programs, and attitudes of woodland owners all influence the decision to locate new wood-using industries in a particular area. But a major factor is the existence of a sustaining timber supply. Comparisons between desirable cut and product cut show that the Eastern unit of the State has the greatest surplus of timber; so, based on the timber supply, the best opportunities for expanding wood-using industries are there. Similar situations exist in the Northern and Southern Cumberland units.

At the other extreme is the Bluegrass region. A large deficit here is due more to a low desirable cut than to heavy cutting. Most of the region's stands are immature and poorly stocked and only a small percent will be ready for harvest or will require commercial thinning in the next decade. Cutting in the Bluegrass should be reduced until timber stocking improves and the distribution of age classes is more balanced. Comparisons of desirable cut and the 1962 cut for products, for each of the seven survey units of Kentucky are shown in these tabulations:

GROWING STOCK

Survey unit	*Desirable cut (million cubic feet)*	*Cut for products 1962 (million cubic feet)*
Western	13.9	9.1
Western Coalfield	36.5	33.7
Pennyroyal	32.8	29.4
Bluegrass	3.3	7.5
Northern Cumberland	35.4	15.7
Southern Cumberland	30.7	16.8
Eastern	43.1	11.1
Total	195.7	123.3

SAWTIMBER

Survey unit	*Desirable cut (million board feet)*	*Cut for products 1962 (million board feet)*
Western	59.4	48.9
Western Coalfield	143.1	189.1
Pennyroyal	116.8	132.8
Bluegrass	13.8	29.7
Northern Cumberland	147.4	80.1
Southern Cumberland	117.0	90.8
Eastern	211.3	60.4
Total	808.8	631.8

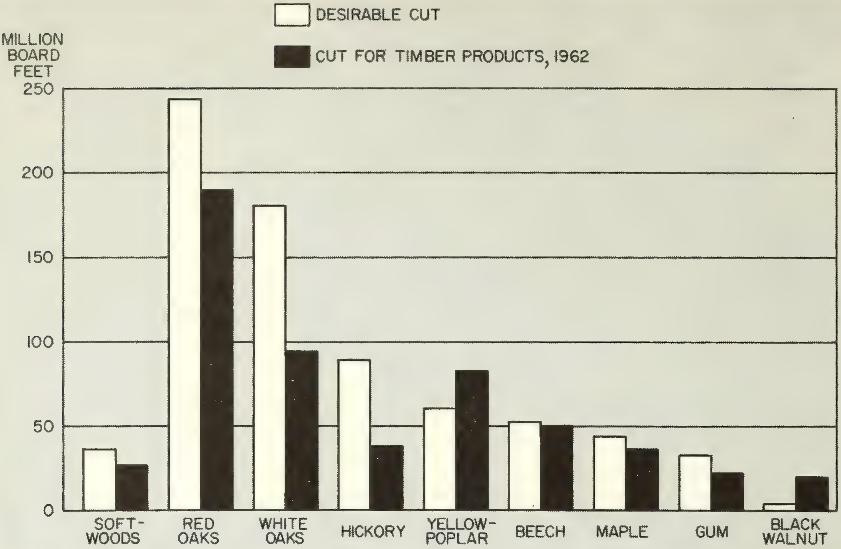


Figure 19.—Comparison of the desirable cut of sawtimber with that actually cut for timber products in 1962 for selected major timber species.

A Word About the Future

We cannot precisely estimate future trends because they depend in large part on human attitudes and behavior, which are changeable. For example, no one can say for certain how consumer tastes for wood products will change or what kinds of new products will be developed. Nor can we predict what shifts will occur in the attitudes of woodland owners toward forest management. However, we do know about present trends and forest conditions, and we can use this information to guide us in a general appraisal of what is to come.

Current data indicate that average stocking is increasing and forest productivity is improving. There are large surpluses of timber for today's needs. In fact, the total rate of timber removal could be increased substantially, and, under normal growth conditions, improvements in productivity and stocking would continue.

The output of products like pulpwood, particle board, and fireplace wood is expected to rise more sharply than that of lumber logs, cooperage bolts, and veneer logs. In fact, a new pulpmill and a new fiberboard plant are in operation and a new pulpmill is under construction. So a greater proportion of future harvests will very likely come from small and low-grade material. This kind of timber is plentiful.

In a total sense then, the outlook for wood supplies in the near future appears favorable even if the harvests are greater. Unfortunately these gross estimates of prospective supplies can mask deficiencies that might occur in certain kinds of timber. Apparently surpluses of small and low-grade material will continue. But we should be concerned about short supplies of high-quality volume for a few important hardwood timber species.

Black walnut deserves particular attention. Black walnut sawtimber now is being cut at a much faster rate than it is growing, and overcutting is greatest in the larger diameter classes where the highest quality material is concentrated. Whether or not severe shortages in this and other quality hardwoods arise will depend primarily on how fast and how much the management and utilization of large timber is improved.

If the desirable cut discussed earlier were actually undertaken, the rate of timber removal from the State would immediately be greater than it is now. But a different kind of timber would be cut. The emphasis would be placed on harvesting older stands of mature and overmature trees before excessive decay and mortality substantially reduced their utility, and on improvement cuttings in younger stands that would develop thrifty crop trees of desirable species.

Most of the effect of the desirable cut would not be realized until after 1972. But even before this date growth would increase and more than offset boosts in the cutting rate. As a result, the timber supply would increase noticeably between 1963 and 1972. Even more important would be the effects on average timber quality and forest stand conditions.

If this cut were made, by 1972 some 500,000 acres of overmature timber would have been removed and another 100,000 acres of forest reaching rotation age each year would have been harvested. Improvement cuttings would have taken place on approximately 175,000 acres each year. Productivity of the forest resource would be greatly enhanced; an improved balance of age classes would be achieved; and Kentucky's forests would be geared to produce a sustained yield of high-quality timber.

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Appendix

FOREST SURVEY PROCEDURE

The resource statistics in this report were obtained from a timber-management-plan forest inventory of the Daniel Boone National Forest and a survey of all other forest land. Both were sampling surveys designed to yield reliable statistics for large areas. Both combined aerial photo interpretation and field work to minimize costs. Both used electronic data-processing machines.

To attain specific levels of statistical accuracy, triple sampling was used. The proportions of forest and nonforest land were determined from aerial photographs. One-fourth of the forest points were stereoscopically classified by forest type, stand size, stocking, and site. One-twelfth of these points were examined on the ground. The ground classifications provided a check on photo classification and a means of improving estimates.

At each forest ground-check point a plot was established. Trees were classified and measured as a basis for estimating timber volume, growth, mortality, and quality. Ownership was determined for each plot.

Timber-cut information was based on forest-industry production records for 1962, on stump counts at forest-inventory plots, cutting records from large owners, and utilization factors based on a logging-residue study.

ACCURACY OF SURVEY ESTIMATE

Estimates of forest area and timber volume are subject to two kinds of errors: (1) nonsampling errors caused by mistakes in judgment, recording of measurements, or in calculation, and (2) sampling errors inherent in statistical work.

Nonsampling errors are not measurable and cannot be shown. They are avoided as much as possible by training of personnel, close supervision, and careful checking of all phases of the work.

Sampling errors are subject to the laws of chance and may be estimated by statistical methods. These errors are held to acceptable levels commensurate with the values involved and funds available by adjusting the survey design and the intensity of the sample. With a probability of 2 out of 3 (that is, relatively good) the accompanying tabulation shows the accuracy of the data in this report:

The sampling error of a survey is less for a large class or block than for a smaller class. Some of the statistics in this report have such large errors that it would be unwise to use them alone, but if they are combined with other figures the errors may be reduced enough to warrant their use. Weak figures are shown to allow various combinations of data.

Guides for judging accuracy of area and volume

Commercial forest land	Sampling error	Growing-stock volumes	Sampling error	Sawtimber volumes	Sampling error
Acres	*Percent ±*	*Thousand cubic feet*	*Percent ±*	*Thousand board feet*	*Percent ±*
11,712,800	0.9	7,389,700	1.3	26,148,110	1.9
5,000,000	1.3	5,000,000	1.6	20,000,000	2.2
1,000,000	2.9	1,000,000	3.5	10,000,000	3.1
500,000	4.2	500,000	4.9	5,000,000	4.4
100,000	9.3	300,000	6.3	1,000,000	9.8
50,000	13.1	100,000	11.0	500,000	13.8
25,000	18.6	50,000	15.5	100,000	30.9
10,000	29.4	10,000	34.7	50,000	43.6
5,000	41.4	5,000	48.9	10,000	97.6
2,000	65.3				
1,000	91.9				

DEFINITION OF TERMS

Land Use Classes

Land area.—The area of dry land and of land temporarily or partially covered by water such as marshes and swamps; flood plains, streams, and sloughs less than ⅛ mile wide; and lakes, reservoirs, and ponds smaller than 40 acres.

Forest land.—Land now or formerly at least 10 percent stocked by forest trees of any size and not currently developed for nonforest use. Excludes urban or thickly settled residential and resort areas, city parks, orchards, farmsteads, improved roads, or lands developed and maintained for nonforest use. The minimum forest area classified was 1 acre. Roadside, streamside, and shelter-belt strips of timber at least 120 feet wide qualified as forest land. Unimproved roads and trails, streams, and clearings less than 120 feet wide in forest land were also included.

Commercial forest land.—Forest land that does or can produce crops of industrial wood and that is not withdrawn from timber utilization by statute or administrative regulation.

Noncommercial forest land.—Unproductive forest land incapable of yielding crops of industrial wood, and productive public forest land withdrawn from commercial timber use through statute or administrative regulation.

Forest Types

Forest-type classification of forest land is based upon species of all live trees.

Southern pine.—Forests in which 50 percent or more of the stocking is shortleaf or other southern yellow pines, singly or in combination.

Redcedar-hardwoods.—Forests in which 50 percent or more of the stocking is hardwoods but in which redcedar makes up at least 25 percent of the stocking. Included also are those areas where redcedar makes up most of the stocking.

Oak-pine.—Forests in which 50 percent or more of the stocking is hardwoods (usually upland oaks) but in which southern pine makes up at least 25 percent of the stocking.

White oak.—Forests in which 50 percent or more of the stocking is white oak, except stands that classify as redcedar-hardwoods or oak-pine.

Oak-hickory.—Forests in which 50 percent or more of the stocking is upland oaks or hickories, singly or in combination, except stands that classify as oak-pine, redcedar-hardwoods, or white oak.

Central mixed hardwoods.—Forests in which 50 percent or more of the stocking is a combination of hardwood species, principally yellow-poplar, maple, beech, basswood, black walnut, elm, and northern red oak, except stands that classify as redcedar-hardwoods, oak-pine, oak-hickory, maple-beech, or elm-ash-cottonwood.

Maple-beech.—Forests in which 50 percent or more of the stocking is maple or beech, singly or in combination, except stands that classify as redcedar-hardwoods or oak-pine.

Oak-gum-cypress.—Bottomland forests in which 50 percent or more of the stocking is blackgum, sweetgum, oak, or southern cypress, singly or in combination, except stands that classify as oak-pine.

Elm-ash-cottonwood.—Forests in which 50 percent or more of the stocking is elm, ash, or cottonwood, singly or in combination except stands that classify as redcedar-hardwoods or oak-pine.

Ownership Classes

National Forest.—Federally owned land within National Forest boundaries and other lands under the administration of the U. S. Forest Service.

Other Federal.—Federal lands, other than National Forest, in military reservations, wildlife refuges, and the like.

State.—Lands the State owns or has leased for more than 50 years.

County and municipal.—Lands that counties or municipalities own or have leased for more than 50 years.

Forest industry.—Land owned by companies or individuals operating wood-using plants.

Farmer-owned.—Lands owned by operators of farms, retired farmers, or wives of farmers. A farm must include 10 or more acres and must yield $50 or more annually from agricultural products or, if less than 10 acres, the yield must be at least $250 annually. Forest land owned by a farmer is classified as farmer-owned, whether or not the tract contains an agricultural operation, unless the owner operates a forest industry. Lands leased by farm operators from such owners as railroads, States, and pulp companies are not considered to be farmer-owned.

Miscellaneous private.—Private owned lands other than forest-industry or farmer-owned.

Stand-size Classes

Stand-size class.—A classification of forest land based on the predominant size of timber present; sawtimber, poletimber, or seedlings and saplings.

Sawtimber stands.—Stands that are at least 10 percent stocked with growing-stock trees and have half or more of this stocking in sawtimber or poletimber trees, with sawtimber stocking at least equal to poletimber stocking.

Poletimber stands.—Stands that are at least 10 percent stocked with growing-stock trees and that have half or more of this stocking in sawtimber and/or poletimber trees, with poletimber stocking exceeding that of sawtimber.

Seedling-sapling stands.—Stands that are at least 10 percent stocked with growing-stock trees and in which seedlings and/or saplings comprise more than half of this stocking.

Nonstocked areas.—Commercial forest lands that are less than 10 percent stocked with growing-stock trees.

Stocking Classes

Stocking class.—A classification of commercial-forest land based on the percent of area occupied by growing-stock trees. Growing-stock trees include all live trees except culls.

Well stocked.—Stands that are 70 percent or more stocked with growing-stock trees.

Medium stocked.—Stands that are 40 to 69 percent stocked with growing-stock trees.

Poorly stocked.—Stands that are from 10 to 39 percent stocked with growing-stock trees.

Nonstocked.—Areas of commercial-forest land not qualifying as sawtimber, poletimber, or seedling-and-sapling stands. These areas may contain some volume but less than 10 percent of the growing space is effectively utilized by growing stock.

Area-Condition Classes

Area-condition.—Classification of commercial-forest land is based upon stocking by desirable growing-stock trees and conditions affecting current and prospective timber growth. Desirable growing-stock trees have no serious defects in quality to limit present or prospective use. They have relatively high vigor and contain no pathogens that may cause death or serious deterioration before rotation age. These trees would be favored in silvicultural operations.

Desirable.—Areas that are 70 percent or more stocked with desirable trees.

Moderate and favorable.—Areas that are 40 to 70 percent stocked with desirable trees and in which 30 percent or less of the area has other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Moderate and unfavorable.—Areas that are 40 to 70 percent stocked with desirable trees and in which more than 30 percent of the area has other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Poor but favorable.—Areas that are less than 40 percent stocked with desirable trees and in which 30 percent or less of the area has other trees and/or inhibiting vegetation or surface conditions that prevent occupancy by desirable trees.

Poor and unfavorable.—Areas that are less than 40 percent stocked with desirable trees and in which more than 30 percent of the area has other trees and/or inhibiting vegetation or surface conditions that prevent occupancy by desirable species.

Site Class

A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Stand-Age Classifications

Stand-age classifications are determined from the age of the main stand for both even-and uneven-aged stands.

Tree Classifications

Growing-stock trees.—All live sawtimber, poletimber, and sapling and seedling trees. Cull trees are not considered growing stock.

Sawtimber trees.—Live trees of commercial species containing at least an 8-foot sawlog. Softwoods must be at least 9 inches and hardwoods at least 11 inches d.b.h. outside bark.

Poletimber trees.—Live trees of commercial species at least 5 inches d.b.h. but smaller than sawtimber size, and of good form and vigor.

Saplings.—Live trees of commercial species 1 to 5 inches d.b.h. and of good form and vigor.

Seedlings.—Live trees of commercial species less than 1 inch d.b.h. that are expected to survive.

Sound cull trees.—Live trees of sawtimber of poletimber size that are unmerchantable for sawlogs, now or prospectively, because of roughness, poor form, or species.

Rotten cull trees.—Live trees of sawtimber or poletimber size that are unmerchantable for sawlogs, now or prospectively, and with more than 50 percent of the defect due to rot.

Salvable dead trees.—Standing or down dead trees that are currently merchantable.

Diameter Measurements

Diameter at breast height.—The diameter of a tree at 4.5 feet above ground level.

Diameter class.—Trees in a 2-inch diameter range, ranging from 1.0 inch below the midpoint of the class to 0.9 inch above the midpoint. For example, the 6-inch class would include trees from 5.0 to 6.9 inches d.b.h.

Volume Classifications

Cord.—The amount of stacked wood contained in a pile whose dimensions indicate a gross volume of 128 cubic feet; equivalent to 79 cubic feet of solid wood.

Board foot.—A unit of measure for lumber 1 inch thick and 1 foot square.

Volume of sawtimber.—Net volume of the sawlog portion of live sawtimber trees in board feet, International ¼-inch rule.

Volume of growing stock.—Volume of sound wood in the bole of sawtimber and poletimber trees from stump to a minimum 4.0-inch top outside bark or to the point where the central stem breaks into limbs.

Volume of all timber.—The volume of sound wood in the bole of growing stock, cull, and salvable dead trees 5.0 inches and larger in diameter at breast height, from stump to a minimum 4.0-inch top bark or to the point where the central stem breaks into limbs.

Log Grades

Log grades are a classification of log quality based on external indicators.

Hardwoods were graded according to *Hardwood Log Grades for Standard Lumber* published by the U. S. Forest Products Laboratory in 1953. Hardwood log grades include, in addition to the above, a grade 4 or tie-and-timber grade. A tie-and-timber log had to be sound internally, with no single knot or group of knots within any 6-inch section exceeding one-third the log diameter at that point. Rotten defects or holes could not extend more than 3 inches into the potential tie or timber. Sweep could not exceed one-fourth the scaling diameter in any 8 feet of length.

Softwoods other than eastern white pine and redcedar were graded according to the U. S. Forest Service's *1953 Interim Log Grades for Southern Pine* using the specifications for 4-face grading. Eastern white pine was graded according to revised *Trial Log Grades for Eastern White Pine* prepared by the U. S. Forest Service in 1960. Merchantable redcedar logs were assigned grade 1. To be considered merchantable, redcedar logs had to be sound of heart, with sweep not exceeding two-thirds of the small end diameter.

Growth

Net annual growth.—The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth less volume losses resulting from natural causes.

Growing-stock growth.—Net annual growth of poletimber and sawtimber trees in cubic feet.

Sawtimber growth.—Net annual growth of sawtimber trees in board feet, International ¼-inch rule.

Mortality

Mortality of growing stock.—Cubic-foot volume of sound wood in sawtimber and poletimber trees that died from natural causes.

Mortality of sawtimber.—Net board-foot volume of sawtimber trees that died from natural causes.

Timber Cut

Timber cut from growing stock.—The net cubic-foot volume of sound wood in live sawtimber and poletimber trees cut for forest products in a specified year, including both roundwood products and logging residues.

Timber cut from sawtimber.—The net board-foot volume of live sawtimber trees cut for forest products in a specified year, including both roundwood products and logging residues.

Timber products output.—The volume of rough forest products cut from growing stock, cull and dead trees, limbwood, and plant by products.

Logging residue.—The net volume of live sawtimber and poletimber trees cut or killed by commercial logging operations on commercial forest land and not converted to timber products.

Desirable Cut

Desirable cut (formerly called allowable cut).—The net volume of live sawtimber and poletimber trees that can be cut annually during the next 10 years in commercial logging operations while growing stock is maintained or increased and age classes below the rotation age selected for each type are distributed evenly. It includes harvest and improvement cuts yielding 3 cords or more per acre, and one-tenth of the entire net volume of stands 10 or more years beyond the rotation age. Rotation ages for sawlog trees in extensively managed stands by forest type and site-index classes are shown below:

Forest type	*Site index (50-year height in feet)**						
	40	50	60	70	80	90	100+
Southern pine	120	110	90	—	—	—	—
Redcedar-hardwoods	120	110	90	—	—	—	—
Oak-pine	120	110	90	—	—	—	—
White oak	120	110	90	80	75	70	—
Oak-hickory	120	110	90	80	75	70	—
Central mixed hardwoods	—	110	90	80	75	70	60
Maple-beech	—	100	100	100	100	—	—
Oak-gum-cypress	—	—	—	80	75	70	60
Elm-ash-cottonwood**	—	—	—	80	70	60	60

*Except in the case of cottonwood for which it is total height at 25 years.

**The rotation for cottonwood is half of the age shown.

Desirable cut includes all timber of merchantable size that should be cut from commercial-forest land to salvage, rejuvenate, or improve the stands and increase the growth without regard to restraints of ownership, inaccessibility, or profit.

PRINCIPAL COMMERCIAL TREE SPECIES OF KENTUCKY[4]

Softwoods

Cypress (baldcypress)	*Taxodium distichum* (L) Rich.
Hemlock (eastern)	*Tsuga canadensis* (L.) Carr.
Pine group includes—	
Shortleaf pine	*Pinus enchinata* Mill.
Other yellow pines:	
Pitch pine	*P. rigida* Mill.
Virginia pine	*P. virginiana* Mill.
White pine (eastern)	*P. strobus* L.
Redcedar (eastern)	*Juniperus virginiana* L.

Hardwoods

Ash	*Fraxinus* L. species.
Basswood	*Tilia* L. species
Beech (American)	*Fagus grandifolia* Ehrh.
Birch (Yellow)	*Betula alleghaniensis* Britton
Blackgum	*Nyssa* L. Species
Black walnut	*Juglans nigra* L.
Cottonwood (eastern)	*Populus deltoides* Bartr.
Hickory	*Carya* Nutt. species
Maple (hard) includes—	
Black maple	*Acer nigrum* Michx. f.
Sugar maple	*A. saccharum* Marsh.
Maple (soft) includes—	
Boxelder	*A. negundo* L.
Red maple	*A. rubrum* var. *rubrum* L.
Silver maple	*A. saccharinum* L.
Oak group includes—	
Select red oaks:	
Cherrybark oak	*Quercus falcata* var. *pagodaefolia* Ell.
Northern red oak	*Q. rubra* L.
Shumard oak	*Q. shumardii* Buckl.
Other red oaks:	
Black oak	*Q. velutina* Lam.
Pin oak	*Q. palustris* Muenchh.
Scarlet oak	*Q. coccinea* Muenchh.
Shingle oak	*Q. imbricaria* Michx.
Southern red oak	*Q. falcata* Michx.
Water oak	*Q. nigra* L.
Willow oak	*Q. phellos* L.

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[4] The common and scientific names are based on: Little, Elbert L., Jr. CHECK LIST OF NATIVE AND NATURALIZED TREES OF THE UNITED STATES (INCLUDING ALASKA). U. S. Dep. Agr., Agr. Handbook 41, 472 pp. 1953.

Select white oaks:	
Bur oak	*Q. macrocarpa* Michx.
Chinkapin oak	*Q. muehlenbergii* Engelm.
Swamp chestnut oak	*Q. michauxii* Nutt.
Swamp white oak	*Q. bicolor* Willd.
White oak	*Q. alba* L.
Other white oaks:	
Chestnut oak	*Q. prinus* L.
Overcup oak	*Q. lyrata* Walt.
Post oak	*Q. stellata* var. *stellata* Wangenh.
Sweetgum	*Liquidambar styraciflua* L.
Yellow-poplar	*Liriodendron tulipifera* L.
Other hardwoods:	
Birch(river)	*Betula nigra* L.
Buckeye (Ohio)	*Aesculus glabra* Willd.
Buckeye (yellow)	*A. octandra* Marsh.
Butternut	*Juglans cinerea* L.
Cherry (black)	*Prunus serotina* Ehrh.
Coffeetree (Kentucky)	*Gymnocladus dioicus* (L.) K. Koch
Cucumbertree	*Magnolia acuminata* L.
Dogwood (flowering)	*Cornus florida* L.
Elm	*Ulmus* L. species
Hackberry	*Celtis occidentalis* L.
Honeylocust	*Gleditsia triacanthos* L.
Locust (black)	*Robinia pseudoacacia* L.
Mulberry (red)	*Morus rubra* L.
Osage-orange	*Maclura pomifera* (Raf.) Schneid.
Persimmon (common)	*Diospyros virginiana* L.
Sassafras	*Sassafras albidum* (Nutt.) Nees
Sycamore (American)	*Platanus occidentalis* L.
Willow (black)	*Salix nigra* Marsh.

Statistical Tables for the State

Table No. *Area*

1. Land area by classes and forest survey units.
2. Area of commercial forest land, by ownership classes and survey units.
3. Area of commercial forest land, by stand-size and ownership classes, and survey units.
4. Area of commercial forest land, by forest type and survey units.
5. Area of commercial forest land, by sawtimber volume and stand-size class.
6. Area of commercial forest land, by stocking classes based on alternative stand components.
7. Area of commercial forest land, by stocking classes of growing-stock trees and by stand-size classes.
8. Area of commercial forest land, by area condition and ownership classes.
9. Area of commercial forest land by sites and ownership classes.

10. Area of commercial forest land, by forest types and ownership classes.
11. Area of commercial forest land by forest types and site classes.
12. Area of commercial forest land by forest types and stand-age classes.
13. Area of noncommercial forest land, by forest types.
14. Area of commercial forest land by forest types and area-condition classes.
15. Area of land and forest land, by counties.

Number of trees

16. Number of growing-stock trees on commercial forest land by diameter class and species group.
17. Number of cull and salvable dead trees on commercial forest land, by species and diameter classes.

Volume of standing trees

18. Volume of timber on commercial forest land, by tree and species classes.
19. Volume of growing stock and sawtimber on commercial forest land, by ownership and species classes.
20. Volume of growing stock and sawtimber on commercial forest land, by stand-size and species classes.
21. Volume of growing-stock trees on commercial forest land by species and diameter classes.
22. Volume of sawtimber on commercial forest land by species and diameter classes.
23. Volume of growing stock on commercial forest land, by species and survey units.
24. Volume of sawtimber on commercial forest land by species and survey units.
25. Volume of sawtimber on commercial forest land, by species and log grades.
26. Volume of salvable dead sawtimber-size trees on commercial forest land, by species groups.
27. Volume of growing stock on commercial forest land, by species, 1949 and 1963.
28. Volume of sawtimber on commercial forest land, by species, 1949 and 1963.
29. Volume of growing stock and sawtimber on commercial forest land, by counties and species classes.

Growth and mortality

30. Net annual growth of growing stock on commercial forest land, by species and survey units.
31. Net annual growth of sawtimber on commercial forest land, by species and survey units.
32. Annual mortality of growing stock and sawtimber on commercial forest land, by species.
33. Annual mortality of growing stock and sawtimber on commercial forest land, by ownership and species classes.

34. Annual mortality of growing stock and sawtimber on commercial forest land, by causes and species classes.

Timber cut and timber products

35. Timber cut for products from growing stock on commercial forest land, by species and survey units.
36. Timber cut for products from live sawtimber on commercial forest land, by species and survey units.
37. Total output of timber products, by type of material used and species classes.
38. Total output of roundwood products, by source and species classes.
39. Number of operating primary-wood using plants, by survey units.
40. Timber cut for products from growing stock on commercial forest land, by products and logging residues and species classes.
41. Timber cut for products from live sawtimber on commercial forest land, by products and logging residues and species classes.
42. Volume of unused plant residues by industrial sources and type of residue, and by species classes.
43. Estimated average annual removal of growing stock from commercial forest land, 1949-1963.

Desirable cut

44. Net annual desirable cut of growing stock on commercial forest land, by species and survey units.
45. Net annual desirable cut of live sawtimber on commercial forest land, by species and survey units.

Table 1.—*Land area by classes and forest survey units, Kentucky, 1963*

(In acres)

Land class	All units	Western	Western Coalfield	Pennyroyal	Bluegrass	Northern Cumberland	Southern Cumberland	Eastern
Forest land:								
Commercial forest	11,712,800	721,300	1,842,700	2,166,800	1,128,000	1,857,800	2,200,700	1,795,500
Unproductive forest	61,700	—	12,600	15,200	6,300	5,400	3,900	18,300
Productive-reserved forest	80,700	1,900	43,300	7,400	1,200	6,200	16,000	4,700
Total forest land	11,855,200	723,200	1,898,600	2,189,400	1,135,500	1,869,400	2,220,600	1,818,500
Nonforest land:								
Cropland	5,186,800	628,700	1,729,000	1,082,400	1,167,800	256,700	261,000	61,200
Pasture and range	6,368,700	469,500	1,208,800	1,212,200	2,792,600	361,500	257,200	66,900
Other	2,101,600	374,400	655,400	287,900	552,700	6,500	35,600	189,100
Total nonforest land[1]	13,657,100	1,472,600	3,593,200	2,582,500	4,513,100	624,700	553,800	317,200
All land[2]	25,512,300	2,195,800	5,491,800	4,771,900	5,648,600	2,494,100	2,774,400	2,135,700

[1] Includes 44,000 acres of water according to survey standards of area classification but defined by Bureau of the Census as land.

[2] From U. S. Bureau of the Census, Land and Water Area of the United States, 1960.

Table 2.—*Area of commercial forest land, by ownership classes and forest survey units, Kentucky, 1963*

(In acres)

Ownership class	All units	Western	Western Coalfield	Pennyroyal	Bluegrass	Northern Cumberland	Southern Cumberland	Eastern
National Forest	452,800	—	—	23,800	13,800	109,200	306,000	—
Other Federal	207,300	79,400	5,500	109,800	—	—	—	12,600
State	76,800	5,800	17,600	4,000	1,300	800	19,400	27,900
County and municipal	5,200	—	—	—	5,200	—	—	—
Forest industry	227,900	18,500	8,200	31,900	16,900	5,200	61,400	85,800
Farmer-owned	7,663,900	506,100	1,329,900	1,603,600	909,400	1,246,300	1,454,800	613,800
Miscellaneous private	3,078,900	111,500	481,500	393,700	181,400	496,300	359,100	1,055,400
All ownerships	11,712,800	721,300	1,842,700	2,166,800	1,128,000	1,857,800	2,200,700	1,795,500

Table 3.—*Area of commercial forest land by stand-size, and ownership classes, and survey units, Kentucky, 1963*

(In acres)

WESTERN UNIT

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber	439,000	—	66,200	18,500	354,300
Poletimber	123,000	—	5,300	—	117,700
Sapling-and-seedling	159,300	—	13,700	—	145,600
Nonstocked	—	—	—	—	—
All classes	721,300	—	85,200	18,500	617,600

WESTERN COALFIELD UNIT

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber	864,800	—	10,800	3,800	850,200
Poletimber	444,600	—	5,600	2,000	437,000
Sapling-and-seedling	503,500	—	6,300	2,200	495,000
Nonstocked	29,800	—	400	200	29,200
All classes	1,842,700	—	23,100	8,200	1,811,400

PENNYROYAL UNIT

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber	964,500	20,300	71,700	13,700	858,800
Poletimber	549,900	3,300	13,300	8,400	524,900
Sapling-and-seedling	641,800	200	24,500	9,700	607,400
Nonstocked	10,600	—	4,300	100	6,200
All classes	2,166,800	23,800	113,800	31,900	1,997,300

BLUEGRASS UNIT

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber	247,300	12,600	—	16,900	217,800
Poletimber	384,500	800	2,000	—	381,700
Sapling-and-seedling	481,100	200	4,500	—	476,400
Nonstocked	15,100	200	—	—	14,900
All classes	1,128,000	13,800	6,500	16,900	1,090,800

NORTHERN CUMBERLAND UNIT

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and miscellaneous private
Sawtimber	847,500	84,600	400	5,200	757,300
Poletimber	503,900	23,100	200	—	480,600
Sapling-and-seedling	505,500	600	200	—	504,700
Nonstocked	900	900	—	—	—
All classes	1,857,800	109,200	800	5,200	1,742,600

Continued

Table 3. — *Continued*

Stand-size class	All ownerships	National forest	Other public	Forest industry	Farmer and miscellaneous private
		SOUTHERN CUMBERLAND UNIT			
Sawtimber	1,141,600	246,300	8,200	11,600	875,500
Poletimber	508,700	53,300	9,600	27,900	417,900
Sapling-and-seedling	534,400	2,500	900	21,900	509,100
Nonstocked	16,000	3,900	700	—	11,400
All classes	2,200,700	306,000	19,400	61,400	1,813,900
		EASTERN UNIT			
Sawtimber	1,074,800	—	16,400	78,400	980,000
Poletimber	256,800	—	17,100	—	239,700
Sapling-and-seedling	459,300	—	5,800	7,400	446,100
Nonstocked	4,600	—	1,200	—	3,400
All classes	1,795,500	—	40,500	85,800	1,669,200
		ALL UNITS			
Sawtimber	5,579,500	363,800	173,700	148,100	4,893,900
Poletimber	2,771,400	80,500	53,100	38,300	2,599,500
Sapling-and-seedling	3,284,900	3,500	55,900	41,200	3,184,300
Nonstocked	77,000	5,000	6,600	300	65,100
All classes	11,712,800	452,800	289,300	227,900	10,742,800

Table 4.—*Area of commercial forest land by forest type and forest survey units, Kentucky, 1963*

(In acres)

Forest type	All units	Western	Western Coalfield	Pennyroyal	Bluegrass	Northern Cumberland	Southern Cumberland	Eastern
Southern pine	367,700	—	16,700	58,200	30,100	99,500	132,800	30,400
Redcedar-hardwoods	548,000	—	116,300	190,300	223,700	—	12,900	4,800
Oak-pine	557,400	6,500	15,700	48,000	22,700	151,200	275,000	38,300
White oak	281,000	9,200	49,000	66,200	12,300	89,400	41,500	13,400
Oak-hickory	4,748,500	298,900	724,100	879,500	283,000	917,900	870,100	775,000
Central mixed hardwoods	4,025,300	180,700	579,100	783,400	361,400	534,200	764,500	822,000
Maple-beech	304,200	—	46,000	45,200	16,000	43,500	49,200	104,300
Oak-gum-cypress	130,100	60,500	69,600	—	—	—	—	—
Elm-ash-cottonwood	750,600	165,500	226,200	96,000	178,800	22,100	54,700	7,300
All types	11,712,800	721,300	1,842,700	2,166,800	1,128,000	1,857,800	2,200,700	1,795,500

Table 5.—*Area of commercial forest land, by sawtimber volume and stand-size classes, Kentucky, 1963*

(In acres)

Volume per acre (board feet)[1]	All stands	Sawtimber stands	Other stands
Less than 1,500 board feet	5,672,700	504,700	5,168,000
1,500 to 5,000 board feet	4,684,900	3,724,200	960,700
More than 5,000 board feet	1,355,200	1,350,600	4,600
All classes	11,712,800	5,579,500	6,133,300

[1] Net volume, International ¼-inch rule.

Table 6.—*Area of commercial forest land, by stocking classes based on alternative stand components, Kentucky, 1963*

(In acres)

Stocking class (percent)	Stocking classified in terms of:		
	All trees	Growing-stock trees	Desirable trees
90 to 100	6,886,900	723,600	9,000
80 to 90	1,694,500	1,479,700	44,000
70 to 80	1,149,200	2,281,000	141,500
60 to 70	810,000	2,402,000	448,500
50 to 60	524,700	2,075,800	915,800
40 to 50	312,600	1,357,500	1,631,500
30 to 40	134,500	717,500	2,318,500
20 to 30	94,600	402,300	2,517,400
10 to 20	59,900	196,400	2,344,900
Less than 10	45,900	77,000	1,341,700
All areas	11,712,800	11,712,800	11,712,800

Table 7.—*Area of commercial forest land, by stocking classes of growing-stock trees and by stand-size classes, Kentucky, 1963*

(In acres)

Stocking class (percent)	All stands	Sawtimber stands	Poletimber stands	Sapling-and-seedling stands	Nonstocked stands
70 or more	4,484,300	2,601,000	1,019,300	864,000	—
40 to 70	5,835,300	2,654,400	1,488,700	1,692,200	—
10 to 40	1,316,200	324,100	263,400	728,700	—
Less than 10	77,000	—	—	—	77,000
All classes	11,712,800	5,579,500	2,771,400	3,284,900	77,000

Table 8.—*Area of commercial forest land, by area-condition and ownership classes, Kentucky, 1963*

(In acres)

Area-condition class	All ownerships	National forest	Other public	Forest industry	Farmer and miscellaneous private
Desirable	194,500	56,800	13,400	3,800	120,500
Moderate and favorable	1,448,200	14,000	25,700	28,600	1,379,900
Moderate and unfavorable	1,547,800	168,000	37,300	5,100	1,337,400
Poor but favorable	1,194,500	23,200	21,600	4,900	1,144,800
Poor and unfavorable	7,327,800	190,800	191,300	185,500	6,760,200
All classes	11,712,800	452,800	289,300	227,900	10,742,800

Table 9.—*Area of commercial forest land by sites and ownership classes, Kentucky, 1963*

(In acres)

Site class[1]	All ownerships	National forest	Other public	Forest industry	Farmer and miscellaneous private
120 or more	484,600	36,800	18,100	25,500	404,200
85 to 120	5,655,100	55,100	119,300	99,900	5,380,800
50 to 85	4,731,300	353,700	113,300	63,500	4,200,800
Less than 50	841,800	7,200	38,600	39,000	757,000
All classes	11,712,800	452,800	289,300	227,900	10,742,800

[1] Potential growth per acre per year in cubic feet.

Table 10.—*Area of commercial forest land, by forest types and ownership classes, Kentucky, 1963*

(In acres)

Forest type	All ownerships	Public ownerships	Private ownerships
Southern pine	367,700	41,500	326,200
Redcedar-hardwoods	548,000	18,200	529,800
Oak-pine	557,400	113,900	443,500
White oak	281,000	18.200	262,800
Oak-hickory	4,748,500	310,000	4,438,500
Central mixed hardwoods	4,025,300	199,100	3,826,200
Maple-beech	304,200	12,700	291,500
Oak-gum-cypress	130,100	2,900	127,200
Elm-ash-cottonwood	750,600	25,600	725,000
All types	11,712,800	742,100	10,970,700

Table 11.—*Area of commercial forest land by forest types and site classes, Kentucky, 1963*

(In acres)

Forest type	All sites	Site class[1]			
		120 or more	85 to 120	50 to 85	Less than 50
Southern pine	367,700	11,900	122,100	206,200	27,500
Redcedar-hardwoods	548,000	—	417,400	130,600	—
Oak-pine	557,400	50,200	215,900	246,400	44,900
White oak	281,000	1,500	187,800	87,000	4,700
Oak-hickory	4,748,500	261,100	2,700,000	1,736,300	51,100
Central mixed hardwoods	4,025,300	126,000	1,538,500	1,760,900	599,900
Maple-beech	304,200	12,100	148,200	100,300	43,600
Oak-gum-cypress	130,100	—	66,000	64,100	—
Elm-ash-cottonwood	750,600	21,800	259,200	399,500	70,100
All types	11,712,800	484,600	5,655,100	4,731,300	841,800

[1] Potential growth per acre per year in cubic feet.

Table 12.—*Area of commercial forest land by forest types and stand-age classes, Kentucky, 1963*

(In acres)

Forest type	All ages	Age class (years)								
		Less than 9	10 to 19	20 to 29	30 to 39	40 to 49	50 to 59	60 to 79	80 to 99	100+
Southern pine	367,700	31,900	69,600	74,700	63,500	64,700	31,800	16,100	11,200	4,200
Redcedar-hardwoods	548,000	51,800	93,300	148,200	112,500	65,900	43,800	22,600	9,900	—
Oak-pine	557,400	16,700	55,900	117,800	116,700	74,500	66,500	80,000	24,500	4,800
White oak	281,000	100	13,000	30,400	45,300	35,400	65,100	66,500	10,100	15,100
Oak-hickory	4,748,500	56,300	257,400	526,100	791,500	813,700	787,100	767,700	529,900	218,800
Central mixed hardwoods	4,025,300	174,300	664,500	929,000	824,400	518,800	344,600	267,500	173,300	128,900
Maple-beech	304,200	9,300	11,300	11,400	31,700	65,500	42,300	44,100	45,800	42,800
Oak-gum-cypress	130,100	—	12,000	7,000	18,000	29,200	18,900	35,500	9,500	—
Elm-ash-cottonwood	750,600	24,400	87,700	152,600	163,200	176,700	82,300	31,900	27,300	4,500
All types	11,712,800	364,800	1,264,700	1,997,200	2,166,800	1,844,400	1,482,400	1,331,900	841,500	419,100

Table 13.—*Area of noncommercial forest land, by forest types, Kentucky, 1963*

Forest type	All areas	Productive-reserved areas	Unproductive areas
Southern pine	1,700	1,700	—
Redcedar-hardwoods	12,000	—	12,000
Oak-pine	20,900	20,900	—
Oak-hickory	92,500	46,400	46,100
Central mixed hardwoods	11,600	11,600	—
Elm-ash-cottonwood	3,700	100	3,600
All types	142,400	80,700	61,700

Table 14.—*Area of commercial forest land by forest types and area-condition classes, Kentucky, 1963*

(In acres)

Forest type	All area conditions	Desirable	Moderate and favorable	Moderate and unfavorable	Poor but favorable	Poor and unfavorable
Southern pine	367,700	20,400	61,200	75,400	50,400	160,300
Redcedar-hardwoods	548,000	4,400	121,100	53,400	95,400	273,700
Oak-pine	557,400	17,800	47,000	95,100	53,500	344,000
White-oak	281,000	5,500	81,800	23,900	29,200	140,600
Oak-hickory	4,748,500	79,800	706,500	680,400	353,100	2,928,700
Central mixed hardwoods	4,025,300	50,500	359,500	508,800	485,600	2,620,900
Maple-beech	304,200	—	—	24,800	16,100	263,300
Oak-gum-cypress	130,100	—	16,900	9,900	26,800	76,500
Elm-ash-cottonwood	750,600	16,100	54,200	76,100	84,400	519,800
All types	11,712,800	194,500	1,448,200	1,547,800	1,194,500	7,327,800

Table 15.—*Area of land and forest land, by counties, Kentucky, 1963*

WESTERN UNIT

County	All land[1]	Forest land			Commercial forest as a percent of land area
		All forest	Non-commercial	Commercial	
	Acres	*Acres*	*Acres*	*Acres*	*Percent*
Ballard	165,800	47,300	—	47,300	28.5
Calloway	243,800	77,100	—	77,100	31.6
Carlisle	125,400	42,400	—	42,400	33.8
Fulton	131,200	32,300	—	32,300	24.6
Graves	358,400	80,200	—	80,200	22.4
Hickman	158,700	38,000	100	37,900	23.9
Livingston	202,900	73,300	—	73,300	36.1
Lyon	162,600	80,600	—	80,600	49.6
McCracken	160,600	37,600	—	37,600	23.4
Marshall	193,900	66,100	1,800	64,300	33.2
Trigg	292,500	148,300	—	148,300	50.7
All counties	2,195,800	723,200	1,900	721,300	32.8

WESTERN COALFIELD UNIT

County	All land	Forest land			Commercial forest as a percent of land area
		All forest	Non-commercial	Commercial	
	Acres	*Acres*	*Acres*	*Acres*	*Percent*
Allen	233,000	83,800	300	83,500	35.8
Barren	311,000	83,600	2,200	81,400	26.2
Butler	283,500	135,500	600	134,900	47.6
Caldwell	228,500	79,200	300	78,900	34.5
Christian	464,600	131,400	1,800	129,600	27.9
Crittenden	233,600	87,800	600	87,200	37.3

Daviess	298,200	70,200	200	70,000	23.5
Edmonson	194,600	117,100	41,200	75,900	39.0
Henderson	281,600	61,300	500	60,800	21.6
Hopkins	355,200	168,700	3,100	165,600	46.6
Logan	360,300	109,700	400	109,300	30.3
McLean	164,500	45,500	100	45,400	27.6
Monroe	213,800	99,000	600	98,400	46.0
Muhlenberg	308,500	140,900	900	140,000	45.4
Ohio	381,400	195,800	1,000	194,800	51.1
Simpson	153,000	23,300	100	23,200	15.2
Todd	240,600	61,700	600	61,100	25.4
Union	219,500	45,700	100	45,600	20.8
Warren	349,400	90,600	400	90,200	25.8
Webster	217,000	67,800	900	66,900	30.8
All counties	5,491,800	1,898,600	55,900	1,842,700	33.6

PENNYROYAL UNIT

County	All land	Forest land			Commercial forest as a percent of land area
		All forest	Non-commercial	Commercial	
	Acres	*Acres*	*Acres*	*Acres*	*Percent*
Adair	251,500	108,800	800	108,000	42.9
Breckenridge	362,300	160,000	1,400	158,600	43.8
Bullitt	192,000	106,600	600	106,000	55.2
Casey	278,400	153,800	1,100	152,700	54.8
Clinton	122,200	64,400	500	63,900	52.3
Cumberland	196,500	119,800	1,100	118,700	60.4
Grayson	329,000	122,500	500	122,000	37.1
Green	180,500	60,200	500	59,700	33.1
Hancock	119,700	56,800	500	56,300	47.0
Hardin	394,200	150,300	1,000	149,300	37.9

Continued

Table 15. — *Continued*

County	All land	Forest land			Commercial forest as a percent of land area
		All forest	Non-commercial	Commercial	
	Acres	*Acres*	*Acres*	*Acres*	*Percent*
Hart	272,000	122,900	5,600	117,300	43.1
Larue	166,400	55,700	400	55,300	33.2
Marion	219,500	82,800	600	82,200	37.4
Meade	197,100	81,000	500	80,500	40.8
Metcalfe	189,400	88,000	500	87,500	46.2
Nelson	279,700	117,200	900	116,300	41.6
Pulaski	403,200	211,200	1,400	209,800	52.0
Russell	154,900	76,300	2,700	73,600	47.5
Taylor	181,800	71,800	600	71,200	39.2
Wayne	281,600	179,300	1,400	177,900	63.2
All counties	4,771,900	2,189,400	22,600	2,166,800	45.4

BLUEGRASS UNIT

County	All land	Forest land			Commercial forest as a percent of land area
		All forest	Non-commercial	Commercial	
	Acres	*Acres*	*Acres*	*Acres*	*Percent*
Anderson	131,800	34,100	100	34,000	25.8
Bath	183,700	56,500	200	56,300	30.6
Boone	161,300	44,400	100	44,300	27.5
Bourbon	192,000	5,100	—	5,100	2.7
Boyle	116,500	20,100	—	20,100	17.3
Bracken	131,800	39,600	300	39,300	29.8
Campbell	96,600	23,800	100	23,700	24.5

Carroll	83,800	26,600	500	26,100	31.1
Clark	165,800	12,200	200	12,000	7.2
Fayette	179,200	5,500	—	5,500	3.1
Fleming	224,000	60,300	200	60,100	26.8
Franklin	135,000	44,700	400	44,300	32.8
Gallatin	64,000	19,600	100	19,500	30.5
Garrard	151,000	23,800	—	23,800	15.8
Grant	160,000	38,400	300	38,100	23.8
Harrison	197,100	33,500	100	33,400	16.9
Henry	185,000	44,800	600	44,200	23.9
Jefferson	240,000	33,500	100	33,400	13.9
Jessamine	113,300	12,200	100	12,100	10.7
Kenton	105,600	28,200	500	27,700	26.2
Lincoln	217,600	58,700	500	58,200	26.7
Madison	285,400	49,200	200	49,000	17.2
Mason	153,000	18,500	—	18,500	12.1
Mercer	163,800	17,600	100	17,500	10.7
Montgomery	130,600	18,700	200	18,500	14.2
Nicholas	130,600	23,900	100	23,800	18.2
Oldham	117,800	22,200	200	22,000	18.7
Owen	224,600	81,000	500	80,500	35.8
Pendleton	178,600	50,500	600	49,900	27.9
Robertson	64,600	16,300	100	16,200	25.1
Scott	181,800	25,600	200	25,400	14.0
Shelby	245,800	31,400	100	31,300	12.7
Spencer	123,500	24,600	100	24,500	19.8
Trimble	93,400	34,600	300	34,300	36.7
Washington	196,500	47,100	300	46,800	23.8
Woodford	123,500	8,700	100	8,600	7.0
All counties	5,648,600	1,135,500	7,500	1,128,000	20.0

Continued

Table 15. — *Continued*

NORTHERN CUMBERLAND UNIT

County	All land	Forest land			Commercial forest as a percent of land area
		All forest	Non-commercial	Commercial	
	Acres	*Acres*	*Acres*	*Acres*	*Percent*
Boyd	101,700	57,200	100	57,100	56.1
Carter	257,300	181,900	1,100	180,800	70.3
Elliott	153,600	114,100	100	114,000	74.2
Greenup	224,000	158,000	3,100	154,900	69.2
Johnson	169,000	136,900	200	136,700	80.9
Lawrence	272,000	222,800	900	221,900	81.6
Lewis	310,400	226,200	300	225,900	72.8
Magoffin	193,900	161,000	1,600	159,400	82.2
Menifee	134,400	109,400	300	109,100	81.2
Morgan	236,200	171,100	900	170,200	72.1
Powell	110,700	82,200	1,500	80,700	72.9
Rowan	185,600	141,800	1,000	140,800	75.9
Wolfe	145,300	106,800	500	106,300	73.2
All counties	2,494,100	1,869,400	11,600	1,857,800	74.5

SOUTHERN CUMBERLAND UNIT

County	All land	Forest land			Commercial forest as a percent of land area
		All forest	Non-commercial	Commercial	
	Acres	*Acres*	*Acres*	*Acres*	*Percent*
Bell	236,800	211,500	12,600	198,900	84.0
Breathitt	316,200	281,900	900	281,000	88.9
Clay	303,400	247,600	400	247,200	81.5
Estill	166,400	125,700	300	125,400	75.4

Jackson	215,700	161,700	500	161,200	74.7
Knox	238,700	177,700	100	177,600	74.4
Laurel	283,500	189,000	1,200	187,800	66.2
Lee	134,400	109,200	200	109,000	81.1
McCreary	261,100	249,800	1,600	248,200	95.1
Owsley	126,100	96,900	100	96,800	76.8
Rockcastle	199,000	140,500	1,100	139,400	70.1
Whitley	293,100	229,100	900	228,200	77.9
All counties	2,774,400	2,220,600	19,900	2,200,700	79.3

EASTERN UNIT

County	All land	Forest land			Commercial forest as a percent of land area
		All forest	Non-commercial	Commercial	
	Acres	*Acres*	*Acres*	*Acres*	*Percent*
Floyd	256,700	193,600	2,100	191,500	74.6
Harlan	300,200	260,600	4,900	255,700	85.2
Knott	227,800	197,600	2,600	195,000	85.6
Leslie	263,700	229,500	2,000	227,500	86.3
Letcher	217,000	185,000	2,800	182,200	84.0
Martin	147,800	130,100	1,700	128,400	86.9
Perry	219,500	187,200	1,000	186,200	84.8
Pike	503,000	434,900	5,900	429,000	85.3
All counties	2,135,700	1,818,500	23,000	1,795,500	84.1

ALL UNITS

All counties	25,512,300	11,855,200	142,400	11,712,800	45.9

[1] From U. S. Bureau of the Census, Land and Water Area of the U. S., 1960.

Table 16.—*Number of growing-stock trees on commercial forest land by diameter class and species group, Kentucky, 1963*

(In thousand trees)

Diameter class (inches at breast height)	All species	Softwoods	Hardwoods
2	1,992,180	180,990	1,811,190
4	796,800	97,230	699,570
6	376,080	40,720	335,360
8	216,220	23,400	192,820
10	139,180	12,830	126,350
12	86,670	6,370	80,300
14	50,280	3,080	47,200
16	27,800	1,280	26,520
18	14,680	460	14,220
20	7,250	170	7,080
22	4,060	90	3,970
24+	5,530	130	5,400
All diameter classes	3,716,730	366,750	3,349,980

Table 17.—*Number of cull and salvable dead trees on commercial forest land, by species and diameter classes, Kentucky, 1963*

(In thousand trees)

Diameter class (inches)	Cull trees	Salvable dead trees
Softwoods:		
5.0 to 8.9	3,780	100
9.0 to 18.9	1,020	20
19.0 and larger	40	[1]
Total	4,840	120
Hardwoods:		
5.0 to 10.9	120,260	1,480
11.0 to 18.9	21,060	490
19.0 and larger	5,440	70
Total	146,760	2,040
All species	151,600	2,160

[1] Less than 500 trees.

Table 18.—*Volume of timber on commercial forest land, by tree and species classes, Kentucky, 1963*

(In thousand cubic feet)

Tree class	All species	Softwoods	Hardwoods
Growing stock:			
Sawtimber			
Sawlog portion	3,746,750	331,290	3,415,460
Upper stem portion	838,230	37,860	800,370
Total sawtimber	4,584,980	369,150	4,215,830
Poletimber	2,804,720	185,520	2,619,200
Total growing stock	7,389,700	554,670	6,835,030
Sound cull:			
Sawtimber	77,980	10,830	67,150
Poletimber	93,000	4,960	88,040
Total sound cull	170,980	15,790	155,190
Rotten cull:			
Sawtimber	52,150	1,300	50,850
Poletimber	29,970	430	29,540
Total rotten cull	82,120	1,730	80,390
Salvable dead:			
Sawtimber	15,190	880	14,310
Poletimber	5,490	—	5,490
Total salvable dead	20,680	880	19,800
All classes[1]	7,663,480	573,070	7,090,410

[1] Estimates of additional volume on unproductive forest land total 6,590 thousand cubic feet in trees, 5.0 inches and larger d.b.h., including 2,400 thousand cubic feet of softwoods and 4,190 thousand cubic feet of hardwoods.

Table 19.—*Volume of growing stock and sawtimber on commercial forest land, by ownership and species classes, Kentucky, 1963*

Ownership class	All species	Softwoods	Hardwoods
GROWING STOCK (In thousand cubic feet)			
National forest	523,230	156,650	366,580
Other public	281,700	70,410	211,290
Forest industry	211,130	11,350	199,780
Farmer and miscellaneous private	6,373,640	316,260	6,057,380
All ownerships	7,389,700	554,670	6,835,030
SAWTIMBER (In thousand board feet)[1]			
National forest	1,290,390	450,650	839,740
Other public	905,380	18,120	887,260
Forest industry	900,330	52,490	847,840
Farmer and miscellaneous private	23,052,010	1,244,620	21,807,390
All ownerships	26,148,110	1,765,880	24,382,230

[1] Internation ¼-inch rule.

Table 20.—*Volume of growing stock and sawtimber on commercial forest land, by stand-size and species classes, Kentucky, 1963*

Stand-size class	All species	Softwood	Hardwoods
	GROWING STOCK (In thousand cubic feet)		
Sawtimber	5,217,490	365,600	4,851,890
Poletimber	1,625,880	133,580	1,492,300
Sapling-and-seedling	544,920	54,870	490,050
Nonstocked	1,410	620	790
All classes	7,389,700	554,670	6,835,030
	SAWTIMBER (In thousand board feet)[1]		
Sawtimber	21,789,940	1,347,560	20,442,380
Poletimber	2,917,170	267,620	2,649,550
Sapling-and-seedling	1,438,330	149,090	1,289,240
Nonstocked	2,670	1,610	1,060
All classes	26,148,110	1,765,880	24,382,230

[1] International ¼-inch rule.

Table 21.—*Volume of growing-stock trees on commercial forest land by species and diameter classes, Kentucky, 1963*

(In thousand cubic feet)

Species	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0 and larger
Softwoods:											
Shortleaf pine	208,660	18,860	35,990	41,940	42,840	35,220	19,360	9,100	2,810	2,340	200
Other yellow pines	228,200	36,930	49,220	53,490	39,340	27,660	14,070	5,210	1,400	700	180
White pine	9,340	780	1,410	2,460	560	460	770	1,070	900	380	550
Hemlock	42,050	3,560	5,270	3,990	4,850	2,820	3,380	3,970	3,500	3,130	7,580
Redcedar	57,350	16,030	17,010	11,540	5,700	3,300	2,940	640	190	—	—
Cypress	7,730	—	—	—	—	820	530	1,130	—	—	5,250
Other	1,340	460	—	—	—	410	—	—	—	470	—
Total softwoods	554,670	76,620	108,900	113,420	93,290	70,690	41,050	21,120	8,800	7,020	13,760
Hardwoods:											
Select white oak	999,490[1]	96,030	138,810	192,500	187,630	146,290	94,050	58,970	35,060	17,620	32,530
Select red oak	349,390[2]	16,370	31,950	39,240	47,830	45,750	41,600	37,250	23,240	19,310	46,850
Other white oak	635,710[3]	48,720	71,970	106,320	103,360	91,710	64,990	44,700	20,110	22,130	61,700
Other red oak	1,382,080[4]	82,790	134,610	189,360	209,860	224,850	188,440	128,020	81,200	51,680	91,270
Hickories	953,970	119,910	164,970	170,450	163,940	116,490	82,570	52,110	30,270	20,350	32,910
Yellow birch	2,090	160	—	660	10	290	390	40	540	—	—
Hard maple	189,230	24,010	34,330	36,660	26,210	23,490	13,530	8,300	6,110	4,760	11,830
Beech	306,040	9,280	17,920	30,530	31,890	35,110	34,100	37,820	23,400	22,720	63,270
Black walnut	66,750	9,080	11,650	11,780	12,260	9,380	7,710	2,800	1,310	760	20
Ash	192,810	24,860	37,020	35,710	31,650	21,240	14,430	6,990	5,360	4,510	11,040
Soft maple	227,290	30,110	35,430	35,730	29,350	27,770	20,420	12,980	10,920	9,530	15,050
Sweetgum	163,880	9,790	21,670	28,920	27,440	23,030	22,860	13,130	6,500	4,150	6,390
Blackgum	134,420	12,860	14,070	21,590	20,010	16,220	22,180	10,750	8,430	3,980	4,330
Cottonwood	48,430	400	300	1,500	1,160	2,970	5,770	7,830	7,350	6,900	14,250
Yellow-poplar	631,300	66,080	86,210	92,160	108,180	82,620	68,090	52,250	29,370	18,540	27,800
Basswood	55,410	3,020	3,250	6,760	7,330	9,630	7,800	2,020	9,370	1,270	4,960
Other	496,740[5]	87,510	91,890	82,300	69,450	47,960	37,540	28,850	20,690	12,080	18,470
Total hardwoods	6,835,030	640,980	896,050	1,082,170	1,077,560	924,800	726,470	504,810	319,230	220,290	442,670
All species	7,389,700	717,600	1,004,950	1,195,590	1,170,850	995,490	767,520	525,930	328,030	227,310	456,430

[1] Approximately nine-tenths of this volume is white oak *(Q. alba)*.

[2] Approximately nine-tenths of this volume is Northern red oak *(Q. rubra)*.

[3] Approximately fourth-fifths of this volume is Chestnut Oak *(Q. prinus)*.

[4] Approximately three-fifths of this volume is black oak *(Q. velutina)* and another 30 percent is Scarlet oak *(Q. coccinea)*.

[5] Approximately one fourth of this volume is elm *(Ulmus spp.)* and another one-fifth is Sycamore *(Platanus occidentalis)*. The remainder is divided among a great variety of species.

Table 22.—*Volume of sawtimber on commercial forest land by species and diameter classes, Kentucky, 1963*

(In thousand board feet)[1]

Species	All classes	Diameter class (inches at breast height)							
		9.0-10.9[2]	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0 and larger
Softwoods:									
Shortleaf pine	698,140	183,890	198,000	165,070	87,390	37,430	12,300	13,370	690
Other yellow pines	729,010	260,280	202,550	148,540	76,440	28,670	7,570	4,330	630
White pine	31,510	11,990	1,910	1,640	2,720	5,040	4,910	1,340	1,960
Hemlock	144,980	17,450	21,880	12,740	13,880	17,550	14,720	11,890	34,870
Redcedar	96,930	39,260	23,020	13,460	16,010	3,870	1,310	—	—
Cypress	59,620	—	—	5,620	2,670	7,930	—	—	43,400
Other	5,690	—	—	2,710	—	—	—	2,980	—
Total softwoods	1,765,880	512,870	447,360	349,780	199,110	100,490	40,810	33,910	81,550
Hardwoods:									
Select white oak	3,235,350	—	994,960	822,050	538,270	347,660	209,160	107,130	216,120
Select red oak	1,600,820	—	259,210	264,590	243,650	230,160	147,190	126,260	329,760
Other white oak	2,320,170	—	525,620	501,010	369,010	257,350	121,510	137,100	408,570
Other red oak	5,684,010	—	1,098,490	1,274,110	1,085,290	780,210	505,810	330,920	609,180
Hickories	2,909,970	—	902,130	661,280	482,060	318,510	187,010	130,730	228,250
Yellow birch	6,270	—	50	1,080	1,780	160	3,200	—	—
Hard maple	542,630	—	137,020	132,170	79,190	49,330	36,760	29,570	78,590
Beech	1,473,700	—	167,190	184,460	191,720	225,040	138,690	143,030	423,570
Black walnut	188,160	—	64,390	49,350	44,090	17,950	7,390	4,910	80
Ash	521,430	—	149,080	114,550	82,950	40,610	33,610	29,940	70,690
Soft maple	710,730	—	143,480	145,470	111,380	74,530	67,230	60,080	108,560
Sweetgum	602,010	—	149,680	130,860	131,110	78,200	41,700	26,890	43,570
Blackgum	499,020	—	106,100	87,820	134,480	63,900	51,730	25,700	29,290
Cottonwood	294,380	—	4,690	16,350	33,190	47,130	47,880	43,220	101,920
Yellow-poplar	2,201,440	—	556,040	448,540	397,070	318,260	182,280	116,820	182,430
Basswood	257,800	—	40,730	54,760	49,500	12,080	59,030	8,510	33,190
Other	1,334,340	—	345,620	265,460	216,600	171,380	127,800	75,880	131,600
Total hardwoods	24,382,230	—	5,644,480	5,153,910	4,191,340	3,032,460	1,967,980	1,396,690	2,995,370
All species	26,148,110	512,870	6,091,840	5,503,690	4,390,450	3,132,950	2,008,790	1,430,600	3,076,920

[1] International ¼-inch rule.

[2] Softwoods only.

Table 23.—*Volume of growing stock on commercial forest land, by species and forest survey units, Kentucky, 1963*

(In thousand cubic feet)

Species	All units	Western	Western Coalfield	Pennyroyal	Blue-grass	Northern Cumberland	Southern Cumberland	Eastern
Softwoods:								
Shortleaf pine	208,660	1,420	—	14,160	3,030	49,560	129,820	10,670
Other yellow pines	228,200	—	3,230	42,510	10,570	70,310	84,570	17,010
White pine	9,340	—	—	—	—	8,830	510	—
Hemlock	42,050	—	370	20	—	12,950	21,280	7,430
Redcedar	57,350	1,230	12,470	21,960	19,050	410	2,230	—
Cypress	7,730	2,410	5,320	—	—	—	—	—
Other	1,340	—	—	—	—	—	700	640
Total softwoods	554,670	5,060	21,390	78,650	32,650	142,060	239,110	35,750
Hardwoods:								
Select white oak	999,490	85,510	164,190	188,910	57,310	189,390	223,990	90,190
Select red oak	349,390	26,280	77,800	58,240	13,300	47,810	59,830	66,130
Other white oak	635,710	47,440	65,830	92,870	20,720	130,070	147,650	131,130
Other red oak	1,382,080	145,920	203,290	178,810	46,470	307,820	305,940	193,830
Hickories	953,970	81,790	159,650	192,070	53,800	124,140	177,310	165,210
Yellow birch	2,090	—	—	—	—	420	1,130	540
Hard maple	189,230	9,990	41,800	51,530	16,700	12,260	25,340	31,610
Beech	306,040	1,520	41,500	63,920	5,160	37,530	68,520	87,890
Black walnut	66,750	1,430	11,840	19,050	10,990	7,540	9,530	6,370
Ash	192,810	22,440	49,110	47,090	27,980	10,520	19,260	16,410
Soft maple	227,290	23,940	37,670	21,270	11,130	20,800	62,230	50,250
Sweetgum	163,880	68,190	61,560	11,650	1,930	1,570	17,260	1,720
Blackgum	134,420	8,450	23,780	30,580	2,640	9,560	33,970	25,440
Cottonwood	48,430	30,880	14,520	1,980	580	420	50	—
Yellow-poplar	631,300	7,690	49,890	108,720	13,850	112,660	163,570	174,920
Basswood	55,410	430	240	2,150	1,400	7,500	11,370	32,320
Other	496,740	74,470	133,220	85,080	64,150	26,060	47,150	66,610
Total hardwoods	6,835,030	636,370	1,135,890	1,153,920	348,110	1,046,070	1,374,100	1,140,570
All species	7,389,700	641,430	1,157,280	1,232,570	380,760	1,188,130	1,613,210	1,176,320

Table 24.—*Volume of sawtimber on commercial forest land, by species and forest survey units, Kentucky, 1963*

(In thousand board feet)[1]

Species	All units	Western	Western Coalfield	Pennyroyal	Blue-grass	Northern Cumberland	Southern Cumberland	Eastern
Softwoods:								
Shortleaf pine	698,140	8,610	—	40,890	10,310	199,930	386,190	52,210
Other yellow pines	729,010	—	8,230	175,410	30,240	208,830	250,650	55,650
White pine	31,510	—	—	—	—	31,320	190	—
Hemlock	144,980	—	2,450	60	—	34,860	69,840	37,770
Redcedar	96,930	1,850	26,280	24,780	39,590	580	3,850	—
Cypress	59,620	14,190	45,430	—	—	—	—	—
Other	5,690	—	—	—	—	—	2,980	2,710
Total softwoods	1,765,880	24,650	82,390	241,140	80,140	475,520	713,700	148,340
Hardwoods:								
Select white oak	3,235,350	341,260	660,450	651,590	154,040	499,780	579,840	348,390
Select red oak	1,600,820	134,950	357,220	265,860	55,670	213,830	252,000	321,290
Other white oak	2,320,170	161,120	232,030	303,050	57,480	424,670	496,750	645,070
Other red oak	5,684,010	642,300	886,340	665,500	140,830	1,256,640	1,156,970	935,430
Hickories	2,909,970	302,850	442,630	551,070	150,340	300,730	513,690	648,660
Yellow birch	6,270	—	—	—	—	160	2,910	3,200
Hard maple	542,630	32,860	82,750	146,040	38,010	29,460	67,470	146,040
Beech	1,473,700	7,010	195,090	310,880	27,390	161,230	304,230	467,870
Black walnut	188,160	7,110	36,950	48,840	30,100	18,070	20,860	26,230
Ash	521,430	70,460	104,820	129,300	66,230	28,670	49,730	72,220
Soft maple	710,730	94,260	140,770	52,140	29,240	52,660	141,350	200,310
Sweetgum	602,010	263,770	224,340	39,040	8,090	4,650	55,860	6,260
Blackgum	499,020	21,460	84,650	104,290	9,580	35,660	119,440	123,940
Cottonwood	294,380	197,950	78,100	12,520	3,710	2,020	80	—
Yellow-poplar	2,201,440	38,980	241,760	433,460	59,360	356,800	470,190	600,890
Other	1,334,340	267,110	382,860	215,690	129,860	45,080	102,990	190,750
Basswood	257,800	2,750	1,550	9,030	4,710	29,080	49,770	160,910
Total hardwoods	24,382,230	2,586,200	4,152,310	3,938,300	964,640	3,459,190	4,384,130	4,897,460
All species	26,148,110	2,610,850	4,234,700	4,179,440	1,044,780	3,934,710	5,097,830	5,045,800

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[1] International ¼-inch rule.

Table 25.—*Volume of sawtimber on commercial forest land, by species and log grades, Kentucky, 1963*

(In thousand board feet)[1]

Species	All grades	Log grades			
		1	2	3	4
Softwoods:					
Shortleaf pine	698,140	24,990	111,040	458,670	103,440
Other yellow pines	729,010	16,900	73,490	415,050	223,570
White pine	31,510	370	7,600	10,730	12,810
Hemlock	144,980	5,690	14,320	85,460	39,510
Redcedar	96,930	96,930	—	—	—
Cypress	59,620	15,620	8,450	28,670	6,880
Other	5,690	170	3,400	1,650	470
Total softwoods	1,765,880	160,670	218,300	1,000,230	386,680
Hardwoods:					
Select white oak	3,235,350	399,890	744,400	1,468,460	622,600
Select red oak	1,600,820	558,320	389,870	552,480	100,150
Other white oak	2,320,170	442,410	643,190	969,730	264,840
Other red oak	5,684,010	1,126,430	1,311,750	1,912,130	1,333,700
Hickories	2,909,970	582,790	597,740	1,271,650	457,790
Yellow birch	6,270	80	1,810	2,530	1,850
Hard maple	542,630	28,310	111,080	230,640	172,600
Beech	1,473,700	178,780	164,750	561,240	568,930
Black walnut	188,160	30,820	46,580	100,060	10,700
Ash	521,430	85,210	140,080	211,450	84,690
Soft maple	710,730	150,430	99,980	310,020	150,300
Sweetgum	602,010	152,410	103,020	281,050	65,530
Blackgum	499,020	40,510	181,100	218,360	59,050
Cottonwood	294,380	129,120	41,340	81,240	42,680
Yellow-poplar	2,201,440	389,420	541,780	922,670	347,570
Basswood	257,800	100,120	57,720	86,500	13,460
Other	1,334,340	238,100	275,760	621,040	199,440
Total hardwoods	24,382,230	4,633,150	5,451,950	9,801,250	4,495,880
All species	26,148,110	4,793,820	5,670,250	10,801,480	4,882,560

Table 26.—*Volume of salvable dead sawtimber-size trees on commercial forest land, by species groups, Kentucky, 1963*

(In thousand board feet)[1]

Species group	Volume
Softwoods	3,300
Hardwoods	40,180
All species	43,480

[1] International ¼-inch rule.

Table 27.—*Volume of growing stock on commercial forest land, by species, Kentucky, 1949 and 1963*

(In thousand cubic feet)

Species	1949	1963
Softwoods:		
Shortleaf pine	213,100	208,660
Other yellow pines	174,800	228,200
Other softwoods	126,800	117,810
Total softwoods	514,700	554,670
Hardwoods:		
White oaks	1,603,300	1,635,200
Red oaks	1,633,500	1,731,470
Hickory	869,200	953,970
Hard maple	173,700	189,230
Beech	395,200	306,040
Black walnut	100,200	66,750
Ash	167,500	192,810
Soft maple	135,900	227,290
Sweetgum	142,900	163,880
Blackgum	160,400	134,420
Yellow-poplar	439,900	631,300
Basswood	113,400	55,410
Elm	172,100	129,630
Sycamore	86,700	90,510
Other hardwoods	387,300	327,120
Total hardwoods	6,581,200	6,835,030
All species	7,095,900	7,389,700

Table 28.—*Volume of sawtimber on commercial forest land, by species, Kentucky, 1949 and 1963*

(In thousand board feet)[1]

Species	1949	1963
Softwoods:		
Shortleaf pine	978,000	698,140
Other yellow pines	523,000	729,010
Other softwoods	453,000	338,730
Total softwoods	1,954,000	1,765,880
Hardwoods:		
White oaks	5,182,000	5,555,520
Red oaks	6,457,000	7,284,830
Hickory	2,631,000	2,909,970
Hard maple	526,000	542,630
Beech	1,959,000	1,473,700
Black walnut	266,000	188,160
Ash	418,000	521,430
Soft maple	326,000	710,730
Sweetgum	462,000	602,010
Blackgum	584,000	499,020
Yellow-poplar	1,830,000	2,201,440
Basswood	509,000	257,800
Elm	357,000	288,000
Sycamore	347,000	379,960
Other hardwoods	847,000	967,030
Total hardwoods	22,701,000	24,382,230
All species	24,655,000	26,148,110

[1] International ¼-inch rule.

Table 29.—*Volume of growing stock and sawtimber on commercial forest land, by counties and species classes, Kentucky, 1963*

WESTERN UNIT

County	Growing stock			Sawtimber		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
	Thousand cubic feet	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*[1]	*Thousand board feet*[1]	*Thousand board feet*[1]
Ballard	49,640	360	49,280	223,220	1,980	221,240
Calloway	58,380	750	57,630	233,120	3,930	229,190
Carlisle	44,050	360	43,690	188,790	2,120	186,670
Fulton	28,530	320	28,210	125,620	1,880	123,740
Graves	48,450	760	47,690	180,300	3,870	176,430
Hickman	40,900	210	40,690	179,900	1,040	178,860
Livingston	61,730	270	61,460	242,300	1,030	241,270
Lyon	72,030	480	71,550	278,540	2,020	276,520
McCracken	37,480	320	37,160	159,300	1,690	157,610
Marshall	58,550	260	58,290	239,820	1,090	238,730
Trigg	141,690	970	140,720	559,940	4,000	555,940
Total	641,430	5,060	636,370	2,610,850	24,650	2,586,200

Continued

Table 29.— *Continued*

WESTERN COALFIELD UNIT

County	Growing stock			Sawtimber		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	*Thousand board feet*[1]
	Thousand cubic feet	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*[1]	*Thousand board feet*[1]	Hard-woods
Allen	53,630	950	52,680	197,910	3,780	194,130
Barren	47,310	1,380	45,930	270,330	10,020	260,310
Butler	87,120	1,230	85,890	325,680	2,960	322,720
Caldwell	48,820	920	47,900	172,090	3,580	168,510
Christian	84,200	1,270	82,930	309,660	3,150	306,510
Crittenden	52,360	780	51,580	184,700	2,120	182,580
Daviess	42,380	890	41,490	161,280	4,460	156,820
Edmonson	48,730	2,010	46,720	85,320	4,020	81,300
Henderson	38,360	460	37,900	146,190	1,860	144,330
Hopkins	109,160	1,710	107,450	401,400	6,210	395,190
Logan	65,030	1,080	63,950	228,590	4,230	224,360
McLean	31,720	350	31,370	121,900	1,320	120,580
Monroe	64,640	1,390	63,250	232,020	5,690	226,330
Muhlenberg	91,540	1,210	90,330	332,420	3,420	329,000
Ohio	122,400	2,600	119,800	445,380	13,150	432,230
Simpson	14,310	300	14,010	52,180	1,470	50,710
Todd	36,550	580	35,970	134,890	1,120	133,770
Union	22,950	550	22,400	86,440	3,140	83,300
Warren	57,920	1,110	56,810	210,080	4,320	205,760
Webster	38,150	620	37,530	136,240	2,370	133,870
Total	1,157,280	21,390	1,135,890	4,234,700	82,390	4,152,310

PENNYROYAL UNIT

County	Growing stock			Sawtimber		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
	Thousand cubic feet	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*[1]	*Thousand board feet*[1]	*Thousand board feet*[1]
Adair	52,030	2,910	49,120	165,410	7,770	157,640
Breckenridge	90,660	4,070	86,590	318,100	12,890	305,210
Bullit	65,610	3,320	62,290	225,440	11,060	214,380
Casey	96,770	3,830	92,940	332,240	11,550	320,690
Clinton	38,900	1,940	36,960	134,120	6,170	127,950
Cumberland	64,410	3,180	61,230	214,510	8,210	206,300
Grayson	61,530	3,610	57,920	209,070	9,890	199,180
Green	32,880	1,470	31,410	113,910	4,240	109,670
Hancock	29,520	1,200	28,320	100,120	3,120	97,000
Hardin	83,590	4,160	79,430	284,120	11,940	272,180
Hart	64,550	2,930	61,620	223,560	9,380	214,180
Larue	33,670	1,510	32,160	117,950	5,250	112,700
Marion	43,970	2,310	41,660	141,880	5,860	136,020
Meade	46,010	3,490	42,520	155,230	12,410	142,820
Metcalfe	52,220	2,650	49,570	177,320	7,430	169,890
Nelson	64,580	4,420	60,160	224,320	14,670	209,650
Pulaski	136,110	19,000	117,110	453,570	59,270	394,300
Russell	39,030	1,900	37,130	123,310	4,770	118,540
Taylor	41,960	1,900	40,060	146,230	5,930	140,300
Wayne	94,570	8,850	85,720	319,030	29,330	289,700
Total	1,232,570	78,650	1,153,920	4,179,440	241,140	3,938,300

Continued

Table 29.— *Continued*

BLUEGRASS UNIT

County	Growing stock			Sawtimber		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
	Thousand cubic feet	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*[1]	*Thousand board feet*[1]	*Thousand board feet*[1]
Anderson	10,750	850	9,900	26,290	1,550	24,740
Bath	29,630	4,600	25,030	90,720	13,990	76,730
Boone	14,670	780	13,890	38,040	1,440	36,600
Bourbon	1,070	80	990	2,230	30	2,200
Boyle	8,030	410	7,620	22,620	410	22,210
Bracken	11,670	640	11,030	31,380	1,210	30,170
Campbell	7,860	500	7,360	19,580	950	18,630
Carroll	8,260	490	7,770	20,960	690	20,270
Clark	3,430	260	3,170	9,540	640	8,900
Fayette	1,260	40	1,220	2,550	70	2,480
Fleming	28,820	1,060	27,760	91,600	1,380	90,220
Franklin	14,230	1,160	13,070	36,970	2,480	34,490
Gallatin	5,590	570	5,020	15,040	1,540	13,500
Garrard	9,150	1,080	8,070	24,070	2,790	21,280
Grant	9,600	540	9,060	24,110	990	23,120
Harrison	10,580	520	10,060	27,920	910	27,010
Henry	13,440	1,190	12,250	32,670	3,220	29,450
Jefferson	12,170	1,370	10,800	33,190	3,700	29,490
Jessamine	4,170	230	3,940	11,720	320	11,400
Kenton	8,930	660	8,270	22,570	1,390	21,180
Lincoln	29,750	1,580	28,170	96,140	2,980	93,160
Madison	16,160	3,010	13,150	48,310	10,310	38,000
Mason	4,510	210	4,300	10,660	310	10,350
Mercer	4,030	360	3,670	9,660	360	9,300
Montgomery	6,480	590	5,890	16,810	900	15,910
Nicholas	6,400	410	5,990	15,690	750	14,940

Oldham	7,610	1,280	6,330	25,130	4,750	20,380
Owen	26,180	2,410	23,770	65,750	6,440	59,310
Pendleton	12,560	800	11,760	34,910	1,800	33,110
Robertson	3,350	210	3,140	7,420	350	7,070
Scott	7,350	350	7,000	19,410	740	18,670
Shelby	9,150	1,160	7,990	24,410	3,280	21,130
Spencer	8,090	1,600	6,490	18,850	4,210	14,640
Trimble	9,540	690	8,850	25,580	1,520	24,060
Washington	14,310	800	13,510	37,620	1,430	36,190
Woodford	1,980	160	1,820	4,660	310	4,350
Total	380,760	32,650	348,110	1,044,780	80,140	964,640

NORTHERN CUMBERLAND UNIT

County	Growing stock			Sawtimber		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
	Thousand cubic feet	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*[1]	*Thousand board feet*[1]	*Thousand board feet*[1]
Boyd	34,880	5,870	29,010	120,180	21,360	98,820
Carter	106,120	13,070	93,050	359,390	44,770	314,620
Elliott	77,680	13,800	63,880	266,860	46,700	220,160
Greenup	97,020	9,430	87,590	342,550	34,740	307,810
Johnson	86,220	7,370	78,850	302,470	28,190	274,280
Lawrence	95,480	10,380	85,100	281,350	36,560	244,790
Lewis	158,420	10,300	148,120	574,760	38,440	536,320
Magoffin	88,170	6,070	82,100	290,320	20,430	269,890
Menifee	90,750	17,390	73,360	272,290	51,680	220,610
Morgan	107,870	10,140	97,730	362,570	33,700	328,870
Powell	61,060	5,920	55,140	197,590	19,720	177,870
Rowan	107,400	14,150	93,250	316,320	42,400	273,920
Wolfe	77,060	18,170	58,890	248,060	56,830	191,230
Total	1,188,130	142,060	1,046,070	3,934,710	475,520	3,459,190

Continued

Table 29.— *Continued*

SOUTHERN CUMBERLAND UNIT

County	Growing stock			Sawtimber		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
	Thousand cubic feet	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*[1]	*Thousand board feet*[1]	*Thousand board feet*[1]
Bell	137,300	11,560	125,740	458,840	37,910	420,930
Breathitt	191,210	15,020	176,190	643,080	47,640	595,440
Clay	168,750	16,090	152,660	577,670	51,410	526,260
Estill	87,340	8,090	79,250	290,070	23,590	266,480
Jackson	125,420	13,940	111,480	351,500	41,940	309,560
Knox	112,600	9,120	103,480	368,770	29,170	339,600
Laurel	138,300	36,370	101,930	433,150	107,560	325,590
Lee	73,900	9,200	64,700	238,300	29,030	209,270
McCreary	245,560	75,070	170,490	667,850	213,780	454,070
Owsley	55,850	5,060	50,790	174,930	14,100	160,830
Rockcastle	105,860	10,360	95,500	344,000	31,550	312,450
Whitley	171,120	29,230	141,890	549,670	86,020	463,650
Total	1,613,210	239,110	1,374,100	5,097,830	713,700	4,384,130

EASTERN UNIT

County	Growing stock			Sawtimber		
	All species	Soft-woods	Hard-woods	All species	Soft-woods	Hard-woods
	Thousand cubic feet	*Thousand cubic feet*	*Thousand cubic feet*	*Thousand board feet*[1]	*Thousand board feet*[1]	*Thousand board feet*[1]
Floyd	128,140	3,390	124,750	549,060	13,490	535,570
Harlan	166,720	4,810	161,910	723,870	20,000	703,870
Knott	133,430	4,070	129,360	578,440	17,470	560,970
Leslie	140,590	4,510	136,080	597,820	18,080	579,740
Letcher	122,070	3,780	118,290	525,150	16,110	509,040
Martin	92,720	2,620	90,100	406,700	11,480	395,220
Perry	127,000	4,270	122,730	541,810	18,690	523,120
Pike	265,650	8,300	257,350	1,122,950	33,020	1,089,930
Total	1,176,320	35,750	1,140,570	5,045,800	148,340	4,897,460
ALL UNITS						
All counties	7,389,700	554,670	6,835,030	26,148,110	1,765,880	24,382,230

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[1] International 1/4-inch rule.

Table 30.—*Net annual growth of growing stock on commercial forest land, by species and forest survey units, Kentucky, 1963*

(In thousand cubic feet)

Species	All units	Western	Western Coalfield	Penny-royal	Blue-grass	Northern Cumberland	Southern Cumberland	Eastern
Softwoods:								
Shortleaf pine	11,500	100	—	1,070	200	3,550	5,860	720
Other yellow pines	16,860	—	340	3,420	1,170	5,270	5,240	1,420
White pine	540	—	—	—	—	510	30	—
Hemlock	2,000	—	10	—	—	760	860	370
Redcedar	3,980	110	730	1,550	1,390	10	190	—
Cypress	340	160	180	—	—	—	—	—
Other	60	—	—	—	—	—	40	20
Total softwoods	35,280	370	1,260	6,040	2,760	10,100	12,220	2,530
Hardwoods:								
Select white oak	43,450	3,870	5,980	8,220	3,490	8,950	9,010	3,930
Select red oak	15,270	1,090	3,530	2,580	840	2,060	2,240	2,930
Other white oak	23,920	2,180	2,220	3,760	1,290	5,630	5,570	3,270
Other red oak	59,490	7,280	9,180	9,330	2,910	12,850	10,160	7,780
Hickories	38,560	2,970	6,560	8,110	2,620	6,380	6,010	5,910
Yellow birch	80	—	—	—	—	20	50	10
Hard maple	9,220	520	2,160	2,610	980	650	1,250	1,050
Beech	6,960	60	1,210	1,870	130	1,000	1,470	1,220
Black walnut	3,640	70	630	860	620	520	540	400
Ash	9,980	1,350	2,490	2,350	1,800	540	1,060	390
Soft maple	12,450	1,040	1,900	1,730	790	1,340	3,150	2,500
Sweetgum	8,290	3,240	2,920	610	90	260	980	190
Blackgum	5,820	520	720	1,530	160	530	1,450	910
Cottonwood	1,900	1,020	740	90	20	30	—	—
Yellow-poplar	54,160	380	3,110	8,750	1,090	11,150	13,510	16,170
Basswood	2,810	20	10	140	40	420	340	1,840
Other	30,470	3,830	7,900	6,200	4,990	1,390	2,440	3,720
Total hardwoods	326,470	29,440	51,260	58,740	21,860	53,720	59,230	52,220
All species	361,750	29,810	52,520	64,780	24,620	63,820	71,450	54,750

Table 31.—*Net annual growth of sawtimber on commercial forest land, by species and forest survey units, Kentucky, 1963*

(In thousand board feet)[1]

Species	All units	Western	Western Coalfield	Penny-royal	Blue-grass	Northern Cumberland	Southern Cumberland	Eastern
Softwoods:								
Shortleaf pine	54,900	590	—	4,280	1,680	19,680	25,650	3,020
Other yellow pines	85,590	—	870	16,920	5,490	27,990	26,920	7,400
White pine	3,120	—	—	—	—	2,600	520	—
Hemlock	8,840	—	90	—	—	3,210	3,550	1,990
Redcedar	12,200	110	2,590	4,520	4,360	110	510	—
Cypress	2,020	1,060	960	—	—	—	—	—
Other	80	—	—	—	—	—	40	40
Total softwoods	166,750	1,760	4,510	25,720	11,530	53,590	57,190	12,450
Hardwoods:								
Select white oak	224,220	19,620	37,010	43,170	15,820	44,640	45,750	18,210
Select red oak	82,070	7,150	18,600	13,020	3,310	12,050	11,370	16,570
Other white oak	124,580	11,690	17,910	18,840	6,050	26,560	25,170	18,360
Other red oak	322,850	40,340	53,530	48,420	10,530	69,580	55,610	44,840
Hickories	157,200	13,570	27,620	34,770	9,820	22,690	21,050	27,680
Yellow birch	700	—	—	—	—	330	330	40
Hard maple	39,320	1,770	11,870	9,840	4,690	2,550	3,160	5,440
Beech	44,590	140	8,000	12,250	680	5,180	9,430	8,910
Black walnut	16,040	270	3,010	3,900	2,550	2,040	2,230	2,040
Ash	40,560	5,360	11,460	8,960	5,840	2,310	3,700	2,930
Soft maple	54,330	4,990	9,470	6,180	4,900	5,210	9,500	14,080
Sweetgum	45,900	21,370	15,360	3,540	700	430	4,090	410
Blackgum	28,350	1,270	3,290	8,270	480	2,020	7,750	5,270
Cottonwood	15,870	9,980	5,010	520	120	240	—	—
Yellow-poplar	237,570	2,570	17,480	46,820	3,740	38,300	56,000	72,660
Basswood	15,970	100	100	720	210	3,290	2,120	9,430
Other	107,850	10,980	34,140	20,920	13,720	4,770	10,030	13,290
Total softwoods	1,557,970	151,170	273,860	280,140	83,160	242,190	267,290	260,160
All species	1,724,720	152,930	278,370	305,860	94,690	295,780	324,480	272,610

[1] International ¼-inch rule.

Table 32.—*Annual mortality of growing stock and sawtimber on commercial forest land, by species, Kentucky, 1963*

Species	Growing stock	Sawtimber
	M cubic feet	*M board feet*[1]
Softwoods:		
Shortleaf pine	590	2,760
Other yellow pines	110	—
White pine	10	40
Hemlock	—	—
Redcedar	—	—
Cypress	—	—
Other	60	190
Total softwoods	770	2,990
Hardwoods:		
Select white oak	740	950
Select red oak	520	2,870
Other white oak	1,030	2,500
Other red oak	3,250	8,100
Hickories	2,030	8,190
Yellow birch	—	—
Hard maple	120	690
Beech	130	870
Black walnut	330	430
Ash	790	1,580
Soft maple	370	710
Sweetgum	130	50
Blackgum	350	2,150
Cottonwood	—	—
Yellow-poplar	1,150	3,860
Basswood	—	—
Other	2,670	6,440
Total hardwoods	13,610	39,390
All species	14,380	42,380

[1] International ¼-inch rule.

Table 33.—*Annual mortality of growing stock and sawtimber on commercial forest land by ownership and species classes, Kentucky, 1963*

Ownership class	All species	Softwoods	Hardwoods
	GROWING STOCK (In thousand cubic feet)		
National forest	1,980	360	1,620
Other public	480	110	370
Forest industry	370	20	350
Farmer and miscellanous private	11,550	280	11,270
All ownerships	14,380	770	13,610
	SAWTIMBER (In thousand board feet)[1]		
National forest	5,450	1,120	4,330
Other public	1,500	30	1,470
Forest industry	1,280	130	1,150
Farmer and miscellaneous private	34,150	1,710	32,440
All ownerships	42,380	2,990	39,390

[1] International ¼-inch rule.

Table 34.—*Annual mortality of growing stock and sawtimber on commercial forest land, by causes and species classes, Kentucky, 1963*

Cause of death	All species	Softwoods	Hardwoods
GROWING STOCK (In thousand cubic feet)			
Fire	1,150	—	1,150
Insects	270	—	270
Disease	1,770	—	1,770
Other and unknown	11,190	770	10,420
All causes	14,380	770	13,610
SAWTIMBER (In thousand board feet)[1]			
Fire	2,570	—	2,570
Insects	1,300	10	1,290
Disease	5,150	—	5,150
Other and unknown	33,360	2,980	30,380
All causes	42,380	2,990	39,390

[1] International ¼-inch rule.

Table 35.—*Timber cut for products from growing stock on commercial forest land, by species and forest survey units, Kentucky, 1962*

(In thousand cubic feet)

Species	All units	Western	Western Coalfield	Penny-royal	Blue-grass	Northern Cumberland	Southern Cumberland	Eastern
Softwoods:								
Shortleaf pine	5,210	70	—	670	410	1,170	2,450	440
Other yellow pines	1,550	—	290	330	40	470	370	50
White pine	180	—	—	—	—	160	20	—
Hemlock	400	—	—	—	—	130	230	40
Redcedar	1,810	180	410	630	500	50	40	—
Cypress	160	120	40	—	—	—	—	—
Other	20	—	—	—	—	—	—	20
Total softwoods	9,330	370	740	1,630	950	1,980	3,110	550
Hardwoods:								
Select white oak	12,240	800	3,250	3,210	680	1,080	1,730	1,490
Select red oak	23,800	2,190	7,950	6,440	1,090	2,840	2,130	1,160
Other white oak	8,050	800	1,430	1,880	500	700	1,270	1,470
Other red oak	13,310	1,230	3,930	3,940	810	1,670	1,190	540
Hickories	10,660	660	2,820	3,700	730	490	1,120	1,140
Yellow birch	—	—	—	—	—	—	—	—
Hard maple	3,660	170	530	520	150	520	560	1,210
Beech	8,580	130	1,740	2,920	240	880	1,510	1,160
Black walnut	3,100	30	780	220	1,580	220	150	120
Ash	2,490	180	620	490	110	560	410	120
Soft maple	2,860	200	1,680	320	30	330	210	90
Sweetgum	2,240	380	1,610	210	—	20	20	—
Blackgum	1,110	50	490	220	40	80	140	90
Cottonwood	1,850	850	880	40	10	60	10	—
Yellow-poplar	12,510	380	2,370	2,490	250	3,270	2,380	1,370
Basswood	1,830	40	110	130	60	650	540	300
Other	5,680	600	2,770	1,040	250	380	380	260
Total hardwoods	113,970	8,690	32,960	27,770	6,530	13,750	13,750	10,520
All species	123,300	9,060	33,700	29,400	7,480	15,730	16,860	11,070

Table 36.—*Timber cut from products from live sawtimber on commercial forest land, by species and forest survey units, Kentucky, 1962*

(In thousand board feet)[1]

Species	All units	Western	Western Coalfield	Penny-royal	Blue-grass	Northern Cumberland	Southern Cumberland	Eastern
Softwoods:								
Shortleaf pine	14,360	70	—	1,570	850	2,490	8,030	1,350
Other yellow pines	5,700	—	540	1,290	170	1,940	1,500	260
White pine	870	—	—	—	—	770	100	—
Hemlock	1,940	—	—	10	—	600	1,110	220
Redcedar	3,000	280	410	1,280	950	20	60	—
Cypress	790	600	190	—	—	—	—	—
Other	30	—	—	—	—	—	—	30
Total softwoods	26,690	950	1,140	4,150	1,970	5,820	10,800	1,860
Hardwoods:								
Select white oak	57,190	4,200	14,660	14,570	2,600	6,130	9,750	5,280
Select red oak	127,920	12,410	46,490	28,010	3,750	16,960	13,140	7,160
Other white oak	37,120	4,290	6,540	6,740	1,560	2,850	7,100	8,040
Other red oak	63,110	6,120	21,940	14,810	2,290	8,280	6,350	3,320
Hickories	37,910	2,630	11,170	10,420	1,790	2,210	5,730	3,960
Yellow birch	—	—	—	—	—	—	—	—
Hard maple	18,150	730	2,800	2,990	420	990	2,570	7,650
Beech	51,730	560	11,270	18,960	1,080	3,370	8,840	7,650
Black walnut	21,230	220	5,310	1,510	10,810	1,480	1,060	840
Ash	11,020	850	3,770	2,640	270	1,260	1,470	760
Soft maple	18,380	1,290	10,980	2,040	190	2,030	1,300	550
Sweetgum	14,660	2,490	10,530	1,340	—	140	160	—
Blackgum	7,340	370	3,220	1,410	290	510	950	590
Cottonwood	11,950	5,600	5,830	240	10	260	10	—
Yellow-poplar	83,280	2,500	15,810	16,650	1,670	21,670	15,830	9,150
Basswood	11,510	230	690	810	350	4,030	3,450	1,950
Other	32,660	3,500	16,990	5,540	620	2,070	2,270	1,670
Total hardwoods	605,160	47,990	188,000	128,680	27,700	74,240	79,980	58,570
All species	631,850	48,940	189,140	132,830	29,670	80,060	90,780	60,430

[1] International ¼-inch rule.

Table 37.—*Total output of timber products, by type of material used and species classes, Kentucky, 1962*

Product and species class	Total output in standard units		Output from roundwood		Output from plant byproducts, standard units
	Unit	Number	Standard units	M cubic feet	
Sawlogs and bolts:					
Softwood	M board feet[1]	24,440	24,440	4,368	—
Hardwood	M board feet[1]	435,940	435,940	63,655	—
Total	M board feet[1]	460,380	460,380	68,023	—
Veneer logs:					
Softwood	M board feet[1]	—	—	—	—
Hardwood	M board feet[1]	12,455	12,455	1,604	—
Total	M board feet[1]	12,455	12,455	1,604	—
Cooperage logs:					
Softwood	M board feet[1]	—	—	—	—
Hardwood	M board feet[1]	21,017	21,017	3,297	—
Total	M board feet[1]	21,017	21,017	3,297	—
Pulpwood:					
Softwood	Standard cords[2]	33,694	33,694	2,594	—
Hardwood	Standard cords[2]	48,471	43,471	3,129	5,000
Total	Standard cords[2]	82,165	77,165	5,723	5,000

Continued

Table 37. — *Continued*

Product and species class	Total output in standard units		Output from roundwood		Output from plant byproducts, standard units
	Unit	Number	Standard units	M cubic feet	
Piling:					
Softwood	M linear feet	—	—	—	—
Hardwood	M linear feet	30	30	15	—
Total	M linear feet	30	30	15	—
Poles:					
Softwood	M pieces	5	5	21	—
Hardwood	M pieces	—	—	—	—
Total	M pieces	5	5	21	—
Mine timbers (round):					
Softwood	M cubic feet	283	283	283	—
Hardwood	M cubic feet	4,053	4,053	4,053	—
Total	M cubic feet	4,336	4,336	4,336	—
Miscellaneous industrial wood:[3]					
Softwood	M cubic feet	70	70	70	—
Hardwood	M cubic feet	3,295	2,945	2,945	350
Total	M cubic feet	3,365	3,015	3,015	350
Posts (round and split):					
Softwood	M pieces	1,600	1,600	1,862	—
Hardwood	M pieces	2,000	2,000	2,627	—
Total	M pieces	3,600	3,600	4,489	—

Fuelwood:					
Softwood	Standard cords[2]	10,000	—	—	10,000
Hardwood	Standard cords[2]	670,000	450,000	30,140	220,000
Total	Standard cords[2]	680,000	450,000	30,140	230,000
All products:					
Softwood	M cubic feet	9,967	9,198	9,198	769
Hardwood	M cubic feet	127,426	111,465	111,465	15,961
Total	M cubic feet	137,393	120,663	120,663	16,730

---

[1] International ¼-inch rule.

[2] Rough wood basis.

[3] Includes charcoal wood, handle bolts, shingle bolts, and the like.

Table 38.—*Total output of roundwood products, by source and species classes, Kentucky, 1962*

(In thousand cubic feet)

Source	All species	Softwoods	Hardwoods
Growing-stock trees[1]			
Sawtimber trees	83.324	4,835	78,489
Poletimber trees	20,945	4,022	16,923
Total	104,269	8,857	95,412
Cull trees[1]	816	83	733
Salvable dead trees[1]	1,786	214	1,572
Other sources[2]	13,792	44	13,748
All sources	120,663	9,198	111,465

[1] On commercial forest land.

[2] Includes noncommercial forest land, nonforest land (like fence rows), trees less than 5.0 inches in diameter, and limbwood.

Table 39.—*Number of operating primary wood-using plants, by forest survey units, Kentucky, 1962*

Kind of plant	All units	Western	Western Coalfield	Penny-royal	Blue-grass	Northern Cumberland	Southern Cumberland	Eastern
Sawmills:								
Large[1]	8	—	4	1	—	1	1	1
Medium[2]	98	11	26	21	4	13	10	13
Small[3]	465	15	56	140	36	94	74	50
Veneer mills	3	1	—	—	1	—	1	—
Cooperage mills	32	3	6	10	4	3	6	—
Handle plants	9	2	3	3	—	—	1	—
Charcoal plants	6	—	—	2	—	2	2	—
All plants	621	32	95	177	45	113	95	64

[1] Annual production, 5 million board feet or more.

[2] Annual production, 1 to 5 million board feet.

[3] Annual production, less than 1 million board feet.

Table 40.—*Timber cut for products from growing stock on commercial forest land, by products and logging residues and species classes, Kentucky, 1962*

(In thousand cubic feet)

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs and bolts	67,020	4,160	62,860
Veneer logs and bolts	1,600	—	1,600
Cooperage logs and bolts	3,300	—	3,300
Pulpwood	5,670	2,540	3,130
Piling	10	—	10
Poles	20	20	—
Mine timbers	4,180	270	3,910
Miscellaneous industrial wood[1]	2,450	70	2,380
Posts	3,060	1,800	1,260
Fuelwood	16,960	—	16,960
All products	104,270	8,860	95,410
Logging residues	19,030	470	18,560
Timber cut	123,300	9,330	113,970

[1] Includes charcoal wood, handle bolts, shingle bolts, and the like.

Table 41.—*Timber cut for products from live sawtimber on commercial forest land, by products and logging residues and species classes, Kentucky, 1962*

(In thousand board feet)[1]

Products and residues	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs and bolts	452,150	20,920	431,230
Veneer logs and bolts	12,460	—	12,460
Cooperage logs and bolts	21,020	—	21,020
Pulpwood	5,720	3,510	2,210
Piling	80	—	80
Poles	—	—	—
Mine timbers	8,320	540	7,780
Miscellaneous industrial wood[2]	11,850	410	11,440
Posts	1,950	690	1,260
Fuelwood	33,750	—	33,750
All products	547,300	26,070	521,230
Logging residues	84,550	620	83,930
Timber cut	631,850	26,690	605,160

[1] International ¼-inch rule.

[2] Includes charcoal wood, handle bolts, shingle bolts, and the like.

Table 42.—*Volume of unused plant residues by industrial sources and type of residue, and by species classes, Kentucky, 1962*

(In thousand cubic feet)

Industrial source[1]	Species class and character of residues								
	All species			Softwoods			Hardwoods		
	Total	Coarse[2]	Fine[3]	Total	Coarse	Fine	Total	Coarse	Fine
Lumber industry	12,165	5,230	6,935	725	339	386	11,440	4,891	6,549
Veneer industry	30	—	30	—	—	—	30	—	30
Other primary industries	552	379	173	—	—	—	552	379	173
Total	12,747	5,609	7,138	725	339	386	12,022	5,270	6,752

[1] Includes only those plants using logs and bolts (primary wood-using plants).

[2] Unused material suitable for chipping, like slabs, edgings and veneer cores.

[3] Unused material not suitable for chipping, like sawdust and shavings.

Table 43.—*Estimated average annual removal of growing stock from commercial forest land, 1949-1963*[1]

(In thousand cubic feet)

Item	All species	Softwoods	Hardwoods
Roundwood products	130,000	10,000	120,000
Logging residues	25,000	1,000	24,000
Other removals[2]	134,000	17,000	117,000
Total removals	289,000	28,000	261,000

[1] The data in this table are estimates of average trend removal that occurred during the 14-year interval between forest inventories. They are not necessarily typical of any given year.

[2] Includes for example, timber that was pushed and burned in the process of land clearing for farms, cities, and highways; was cut in non-commercial stand improvement operations; was set aside in state and roadside park developments or converted to other nonforest or non-commercial forest uses; became unmerchantable because of rot or other deformities.

Table 14.—Net annual allowable cut of growing stock on commercial forest land, by species and forest survey units, Kentucky, 1963

(In thousand cubic feet)

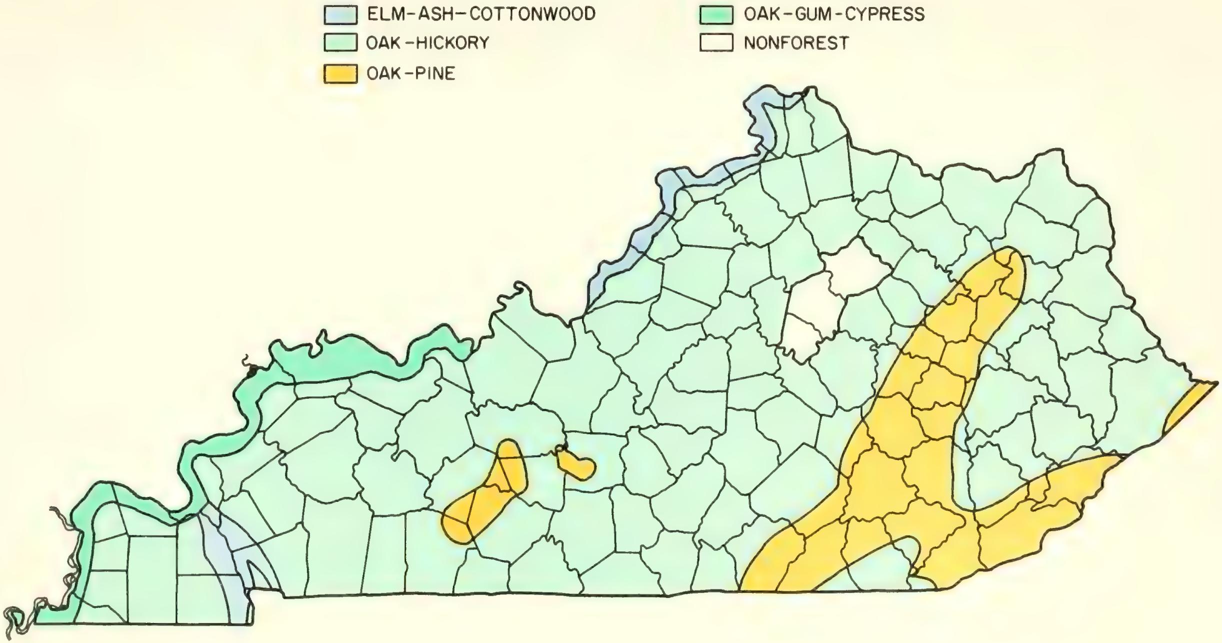
Species	All units	Western	Western Coalfield	Penny-royal	Blue-grass	Northern Cumberland	Southern Cumberland	Eastern
Softwoods:								
Shortleaf pine	4,440	—	—	250	20	1,490	2,490	190
Other yellow pines	2,750	—	—	440	20	1,150	1,080	60
White pine	150	—	—	—	—	150	—	—
Hemlock	1,100	—	90	—	—	230	580	200
Redcedar	580	10	180	280	100	—	10	—
Cypress	190	80	110	—	—	—	—	—
Other	30	—	—	—	—	—	—	30
Total softwoods	9,240	90	380	970	140	3,020	4,160	480
Hardwoods:								
Select white oak	27,240	2,740	7,380	4,390	510	5,070	3,320	3,830
Select red oak	11,430	760	3,150	1,760	190	1,780	960	2,830
Other white oak	20,410	1,490	2,600	2,930	310	4,630	4,190	4,260
Other red oak	39,070	2,100	5,520	4,840	390	11,890	7,880	6,450
Hickories	25,180	1,820	5,000	5,580	600	2,970	3,390	5,820
Yellow birch	110	—	—	—	—	20	20	70
Hard maple	5,780	300	1,490	1,540	50	240	440	1,720
Beech	9,920	50	1,520	1,970	40	1,110	900	4,330
Black walnut	950	50	110	450	50	140	40	110
Ash	4,480	560	1,050	1,530	110	400	130	700
Soft maple	5,820	580	720	510	170	940	1,030	1,870
Sweetgum	3,640	880	1,540	610	—	30	530	50
Blackgum	4,210	200	840	590	70	340	770	1,400
Cottonwood	1,110	680	390	—	40	—	—	—
Yellow-poplar	14,440	200	1,610	3,070	270	2,140	2,250	4,900
Basswood	1,760	—	—	50	20	180	140	1,370
Other	10,910	1,380	3,160	2,010	320	560	600	2,880
Total hardwoods	186,460	13,790	36,080	31,830	3,140	32,440	26,590	42,590
All species	195,700	13,880	36,460	32,800	3,280	35,460	30,750	43,070

Table 45.—*Net annual desirable cut of live sawtimber on commercial forest land, by species and forest survey units, Kentucky, 1963*

(In thousand board feet)[1]

Species	All units	Western	Western Coalfield	Penny-royal	Blue-grass	Northern Cumberland	Southern Cumberland	Eastern
Softwoods:								
Shortleaf pine	19,170	—	—	950	130	7,150	9,930	1,010
Other yellow pines	9,620	—	—	2,160	100	3,880	3,430	50
White pine	720	—	—	—	—	700	20	—
Hemlock	4,970	—	630	—	—	880	2,530	930
Redcedar	1,010	—	480	50	460	—	20	—
Cypress	1,300	420	880	—	—	—	—	—
Other	210	—	—	—	—	—	—	210
Total softwoods	37,000	420	1,990	3,160	690	12,610	15,930	2,200
Hardwoods:								
Select white oak	97,970	11,350	29,380	15,540	1,640	14,640	8,960	16,460
Select red oak	56,650	4,260	15,460	7,470	1,030	9,380	4,150	14,900
Other white oak	83,460	6,070	8,330	10,360	1,460	17,740	17,010	22,490
Other red oak	185,860	9,270	26,320	20,230	1,740	59,770	33,530	35,000
Hickories	88,350	5,870	14,180	17,260	2,800	10,190	12,050	26,000
Yellow birch	560	—	—	—	—	10	110	440
Hard maple	20,930	1,290	3,910	4,250	210	470	1,930	8,870
Beech	52,010	290	8,180	9,370	200	5,380	4,500	24,090
Black walnut	3,410	310	380	1,420	180	380	110	630
Ash	16,500	1,690	3,350	5,160	510	1,310	520	3,960
Soft maple	21,990	2,840	2,450	1,290	660	2,600	2,870	9,280
Sweetgum	13,940	4,410	5,350	1,760	10	150	1,900	360
Blackgum	17,910	300	3,190	1,950	260	1,040	2,950	8,220
Cottonwood	6,900	4,480	2,110	—	300	10	—	—
Yellow-poplar	61,400	1,150	7,980	11,540	940	9,690	8,400	21,700
Basswood	8,520	—	—	150	90	710	530	7,040
Other	35,410	5,360	10,510	5,940	1,050	1,330	1,530	9,690
Total hardwoods	771,770	58,940	141,080	113,690	13,080	134,800	101,050	209,130
All species	808,770	59,360	143,070	116,850	13,770	147,410	116,980	211,330

THE FOREST TYPES OF KENTUCKY - 1963



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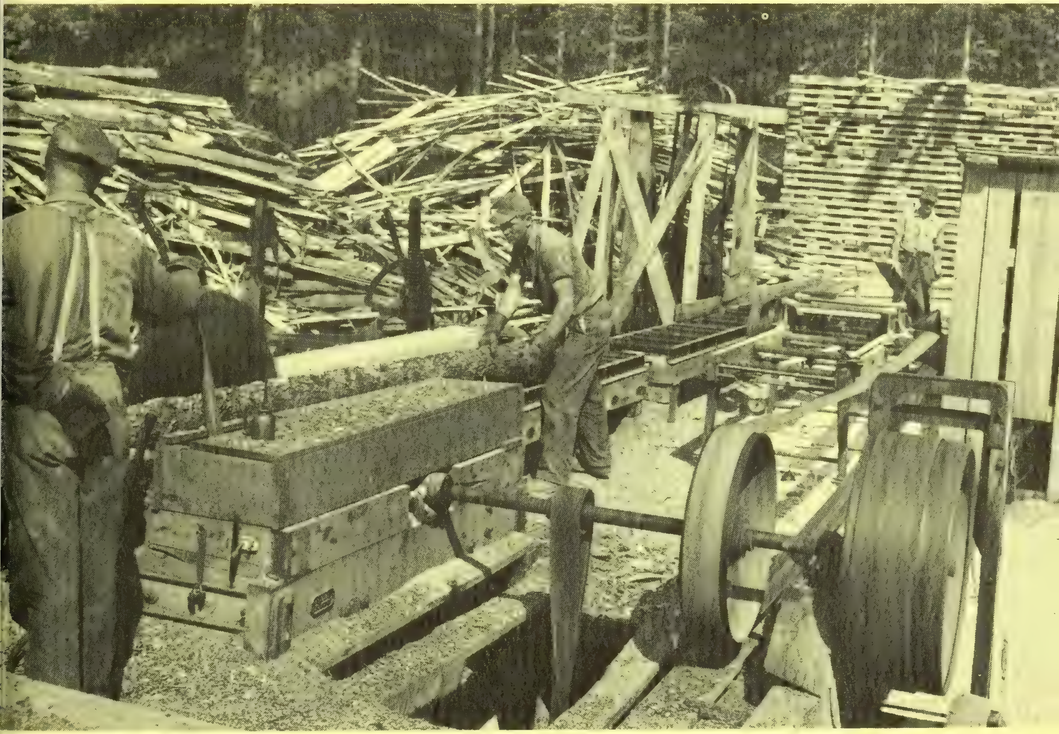

U. S. FOREST SERVICE RESOURCE BULLETIN NE-10
1968

NORTHEASTERN FOREST EXPERIMENT STATION, UPPER DARBY, PA.
FOREST SERVICE, U. S. DEPARTMENT OF AGRICULTURE
RICHARD D. LANE, DIRECTOR

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TIMBER PRODUCTS PRODUCTION
in West Virginia
1965

by Neal P. Kingsley
and David R. Dickson

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Foreword

THIS study was funded through the Appalachian Regional Development Act of 1965 and was conducted by the Forest Survey Project of the Northeastern Forest Experiment Station with the assistance of the State Forester and the Extension Forester of West Virginia, and the Monongahela Power Company. The State Forester's office and the Extension Forester provided lists of wood-using industries in the State, and the Monongahela Power Company assisted in the field follow-up of nonrespondents to the mail canvass.

Making a Comeback

IN 1909 WEST VIRGINIA led the Nation in timber production. Since then West Virginia's position has slipped. The State's forests could not long sustain such heavy cutting; therefore many of the large sawmills either closed down, reduced their operations, or moved out of State. All the woodpulp mills either discontinued operations or moved out of the State. Today the State's forest industries are characterized by small operations; and in 1962 West Virginia ranked twenty-fifth among the states in the output of roundwood products.

Since the period of heavy cutting in the late 1800's and early 1900's, West Virginia's forest resource has made an impressive comeback. Today wood in West Virginia is growing about twice as fast as it is being cut. According to the 1961 forest survey of West Virginia,[1] the annual growth of growing stock[2] in the State totaled 370 million cubic feet while timber cut totaled 119 million cubic feet. More than 1 billion board feet of sawtimber is being added to the resource each year while less than ½ billion is being removed.

This lower level of cutting, a rapid rate of farm abandonment with a consequent increase in forest acreage, and the widening application of forest-management practices have rejuvenated the State's forest resource. Thus today the average timber stand in West Virginia is young and vigorous.

Where once the overriding issue for those concerned with West Virginia's forest resource was timber supply, now, because the supply of timber is increasing, attention is shifting to problems of forest-products production and timber demand. Therefore in 1966 we conducted a study to provide as detailed information as possible about the timber-products output of West Virginia in 1965. This information should prove valuable in projecting timber demand and in locating available supplies of primary forest products. This report assesses the production of forest products and the level of the timber harvest in 1965.

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[1] Ferguson, Roland H. THE TIMBER RESOURCES OF WEST VIRGINIA. U. S. Forest Serv. Resource Bull. NE-2. 123 pp., illus. NE. Forest Exp. Sta., Upper Darby, Pa. 1964.

[2] See appendix for definitions of this term and other terms used in this report.

Wherever possible we have tried to present as detailed data as possible. For those products for which county data are both available and meaningful, county estimates have been presented. However, other products are best presented on a regional or statewide basis.

To facilitate comparison with the 1961 West Virginia Timber Resource Report,[1] the State has been divided into three geographic units (fig. 1). These units generally correspond to the Northeastern, Southern, and Northwestern geographic strata presented in the forest-survey report. To provide finer breakdowns, these units have been further divided into subunits, with two subunits to each unit. The subunits are approximately equal in total area and each consists of 7 to 12 counties.

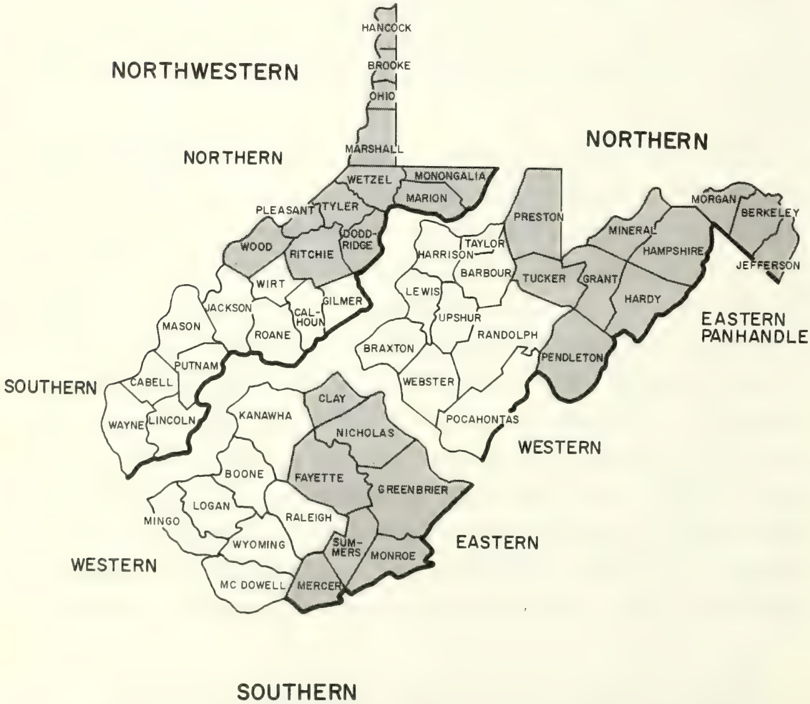

Figure 1.—The geographic units and subunits in West Virginia.

Total Production & Economic Importance

In 1965 timber-products output totaled 154 million cubic feet (table 1). Ninety-one percent of this material was hardwood, and 9 percent was softwood. Not all of these products were produced from roundwood: 18 million feet was produced from the byproducts of other wood-using industries. Most of these byproducts were sawmill slabs and edgings that either were chipped for pulpwood and other fiber products, or were sold or given away as fuelwood.

Sawlogs accounted for 55 percent—84.5 million cubic feet—of all products. Pulpwood was the second most important product—35 million cubic feet—nearly 23 percent of the total output of timber products. Fuelwood was the third most important product with a total of 12 million cubic feet. However, nearly two-thirds of the fuelwood was produced from other wood-industry byproducts, primarily from sawmill slabs and edgings. Somewhat surprisingly, mine timbers ranked fourth with 11 million cubic feet. Despite the prevalence of roof-bolting in deep mines and the large increase in the amount of coal produced from strip mines, mine timbers are still an important product in mining regions.

These four products—sawlogs, pulpwood, fuelwood, and mine timbers—accounted for 93 percent of the total timber-products produced in West Virginia in 1965. The remaining 7 percent included varied products like veneer logs, cooperage bolts, charcoal wood, rustic fencing, turned products, posts, and poles.

By comparison, 1965 was a substantially better year for wood-products producers than was 1960. Total production in 1965 was more than 18 percent above the 1960 production of 130 million cubic feet.[3] All products, with a few minor exceptions, increased from the 1960 levels. Sawlog production was up nearly 47 percent, and pulpwood production was up nearly 38 percent from

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[3] For a discussion of timber products production in West Virginia in 1960 see: Ferguson, Roland H., THE TIMBER RESOURCES OF WEST VIRGINIA, U. S. Forest Serv. Resource Bull. NE-2, pages 13 and 14, and table 28, page 56. 1964.

Table 1.—*Output of timber products, by source of material and softwoods and hardwoods, West Virginia, 1965*

Product and species group	Standard units	Total output: Number of units	Total output: Thousand cubic feet	Roundwood products: Number of units	Roundwood products: Thousand cubic feet	Plant byproducts: Number of units	Plant byproducts: Thousand cubic feet
Sawlogs:							
Softwoods	M board feet[1]	20,224	3,584	20,224	3,584	—	—
Hardwoods	M board feet[1]	470,494	80,871	470,494	80,871	—	—
Total	M board feet[1]	490,718	84,455	490,718	84,455	—	—
Veneer logs and bolts:							
Softwoods	M board feet	—	—	—	—	—	—
Hardwoods	M board feet	4,601	791	4,601	791	—	—
Total	M board feet	4,601	791	4,601	791	—	—
Cooperage:							
Softwoods	M board feet	—	—	—	—	—	—
Hardwoods	M board feet	4,426	761	4,426	761	—	—
Total	M board feet	4,426	761	4,426	761	—	—
Pulpwood:							
Softwoods	Standard cords[2]	102,600	8,722	102,300	8,696	300	26
Hardwoods	Standard cords[2]	309,100	26,273	217,000	18,445	92,100	7,828
Total	Standard cords[2]	411,700	34,995	319,300	27,141	92,400	7,854
Poles:							
Softwoods	M pieces	1	12	1	12	—	—
Hardwoods	M pieces	—	—	—	—	—	—
Total	M pieces	1	12	1	12	—	—

Mine timbers (Round and split)							
Softwoods	M cubic feet	898	898	898	898	—	—
Hardwoods	M cubic feet	10,114	10,114	10,114	10,114	—	—
Totals	M cubic feet	11,012	11,012	11,012	11,012	—	—
Charcoal:							
Softwoods	Standard cords	—	—	—	—	—	—
Hardwoods	Standard cords	76,800	6,144	62,300	4,984	14,500	1,160
Total	Standard cords	76,800	6,144	62,300	4,984	14,500	1,160
Posts (Round and split)							
Softwoods	M pieces	18	28	18	28	—	—
Hardwoods	M pieces	1,881	2,641	1,881	2,641	—	—
Total	M pieces	1,899	2,669	1,899	2,669	—	—
Fuelwood:							
Softwoods	Standard cords	6,329	506	2,591	207	3,738	299
Hardwoods	Standard cords	149,799	11,984	52,779	4,222	97,020	7,762
Total	Standard cords	156,128	12,490	55,370	4,429	100,758	8,061
Miscellaneous:[3]							
Softwoods	M cubic feet	—	—	—	—	—	—
Hardwoods	M cubic feet	1,031	1,031	161	161	870	870
Total	M cubic feet	1,031	1,031	161	161	870	870
All products:							
Softwoods	M cubic feet	—	13,750	—	13,426	—	325
Hardwoods	M cubic feet	—	140,610	—	122,990	—	17,620
Total	M cubic feet	—	154,360	—	136,415	—	17,945[4]

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[1] International ¼-inch rule.

[2] Rough wood basis (chips converted to equivalent standard cords).

[3] Includes hewn ties, excelsior bolts, shingle bolts, turnery bolts, chemical wood, and the like.

[4] Does not include 624 thousand cubic feet of plant byproducts used for agricultural bedding, mulch, etc.

1960. The production of veneer logs and cooperage bolts in 1965 was more than double the 1960 production.

The Growing Stock

In 1965 growing-stock material accounted for 85 percent of the total output of timber products. Among the products the percent of output from growing stock ranged from a low of only 18 percent for fuelwood to a high of 100 percent for veneer logs and cooperage bolts (table 2).

All usable or growing-stock volume of cut trees does not necessarily become timber products. Some wood often is left as woods residue because market demands or other factors do not permit removing this material. However, in some cases more material may be removed than is considered growing stock. But generally more growing stock is cut than is used for timber products. In 1965 West Virginia produced 131 million cubic feet of timber products from 176 million cubic feet of growing stock that was cut. Thus about 34 percent more growing stock was cut than became timber products (table 3).

Wood-Industry Residues

The wood-products industries, like most manufacturing industries, produce residues or byproducts. In the wood-products industries these residues are sawmill slabs and edgings, sawdust, shavings, veneer cores, and the like. In recent years interest has increased in the utilization of these residues for the manufacture of other wood products. For example, the use of chipped sawmill waste in the manufacture of woodpulp has grown phenomenally in recent years. In 1965 the equivalent of 92 thousand cords of round pulpwood, or 22 percent of the total pulpwood production in West Virginia, was produced from sawmill waste. By comparison, in 1963 the production of pulpwood from sawmill residues totaled only 39 thousand cords.

In addition to the 92 thousand cords of wood chips for pulpwood, an additional 85.6 thousand cords (10.7 million cubic feet) of byproducts was utilized for both industrial and domestic fuel, agricultural mulch and bedding, metalurgical chips, wedges, and many other products (table 4).

Table 2. — *Output of roundwood products by source, and softwoods and hardwoods, West Virginia, 1965*

(Thousand cubic feet)

Product and species group	All sources	Growing-stock trees[1]			Cull trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
Sawlogs:							
Softwoods	3,584	3,584	3,579	5	—	—	—
Hardwoods	80,871	79,855	77,639	2,216	695	321	—
Total	84,455	83,439	81,218	2,221	695	321	—
Veneer logs and bolts:							
Softwoods	—	—	—	—	—	—	—
Hardwoods	791	791	791	—	—	—	—
Total	791	791	791	—	—	—	—
Cooperage:							
Softwoods	—	—	—	—	—	—	—
Hardwoods	761	761	761	—	—	—	—
Total	761	761	761	—	—	—	—
Pulpwood:							
Softwoods	8,696	8,552	6,975	1,577	—	—	144
Hardwoods	18,445	18,020	10,324	7,696	128	187	110
Total	27,141	26,572	17,299	9,273	128	187	254
Poles:							
Softwoods	12	11	9	2	—	—	1
Hardwoods	—	—	—	—	—	—	—
Total	12	11	9	2	—	—	1

CONTINUED

Table 2. — *(Continued)*

Product and species group	All sources	Growing-stock trees[1]			Cull trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
Mine timbers (Round and split):							
Softwoods	898	898	709	189	—	—	—
Hardwoods	10,114	9,912	5,650	4,262	61	91	50
Total	11,012	10,810	6,359	4,451	61	91	50
Charcoal:							
Softwoods	—	—	—	—	—	—	—
Hardwoods	4,984	4,884	2,784	2,100	45	15	40
Total	4,984	4,884	2,784	2,100	45	15	40
Posts (Round and Split):							
Softwoods	28	28	4	24	—	—	—
Hardwoods	2,641	1,769	566	1,203	185	660	27
Total	2,669	1,797	570	1,227	185	660	27
Fuelwood:							
Softwoods	207	104	75	29	—	19	84
Hardwoods	4,222	2,142	1,066	1,076	649	599	832
Total	4,429	2,246	1,141	1,105	649	618	916
Miscellaneous:							
Softwoods	—	—	—	—	—	—	—
Hardwoods	161	156	90	66	1	2	2
Total	161	156	90	66	1	2	2
All products:							
Softwoods	13,425	13,177	11,351	1,826	—	19	229
Hardwoods	122,990	118,290	99,671	18,619	1,764	1,875	1,061
Total	136,415	131,467	111,022	20,445	1,764	1,894	1,290

Table 3. — *Timber cut from growing stock on commercial forest land by products and logging residues, and by softwoods and hardwoods, West Virginia, 1965*

(Thousand cubic feet)

Item	All species	Softwoods	Hardwoods
Roundwood products:			
Sawlogs	83,439	3,584	79,855
Veneer logs and bolts	791	—	791
Cooperage logs and bolts	761	—	761
Pulpwood	26,572	8,552	18,020
Poles	11	11	—
Mine timbers	10,810	898	9,912
Charcoal	4,884	—	4,884
Posts	1,797	28	1,769
Fuelwood	2,246	104	2,142
Miscellaneous	156	—	156
All products	131,467	13,177	118,290
Logging residues	44,821	1,054	43,767
Timber cut	176,288	14,231	162,057

Despite this rapid increase in the use of wood-industry by-products, nearly 18.1 million cubic feet of residues was unused in 1965. Of this total over 10.3 million feet, 82 thousand cords, was suitable for chipping (table 5).

Wood-using Industries' Contribution to the Economy

According to the 1963 Census of Manufacturers, 6.5 percent of West Virginia's labor force is employed in wood-using industries other than the wooden furniture industry.[4] Four and one-half percent of labor force is employed in the primary lumber and wood-products industries, which include logging operations, sawmills, and planing mills. The secondary lumber and wood-products industries, which include those industries that manufacture products from lumber and wood, employ 0.7 percent of the labor force. The remaining 1.3 percent are employed in the pulp, paper, and paperboard industry.

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[4] The wood furniture industry has been omitted here because it is a very minor industry in West Virginia, with less than 350 employees.

The low percentage employed in the secondary lumber and wood-products industries points out that an overwhelming proportion of the State's primary wood products is shipped out of State for manufacture into a final product. West Virginia could realize a greater return from its timber harvest if more material were shipped out of the State as final products (tables 6 and 7).

Table 4. — *Disposition of wood industry residues produced in West Virginia in 1965 by use, type of material, and by softwoods and hardwoods*

(Thousand cubic feet, solid wood equivalent)

Type of residues	Total used and unused	Residues used for — Fiber products[1]	Industrial fuel[2]	Domestic fuel[3]	Other uses[4]	Unused residues[5]
Softwoods:						
Coarse[6]	520	26	72	136	16	270
Fine[7]	341	—	68	23	45	205
Total	861	26	140	159	61	475
Hardwoods:						
Coarse	23,292	7,828	1,314	2,877	1,287	9,986
Fine	12,528	—	3,151	420	1,306	7,651
Total	35,820	7,828	4,465	3,297	2,593	17,637
All species:						
Coarse	23,812	7,854	1,386	3,013	1,303	10,256
Fine	12,869	—	3,219	443	1,351	7,856
Total	36,681	7,854	4,605	3,456	2,654	18,112

[1] Pulpwood chips.

[2] Includes all residues used as fuel by an industrial plant, including the plant at which the residues were produced.

[3] Includes all residues used as domestic fuel whether sold or given away.

[4] Includes livestock bedding, mulch, metallurgical chips, wedges, and other specialty items.

[5] Includes all residues burned or left as waste.

[6] Residues suitable for chipping like slabs and edgings and veneer cores.

[7] Residues not suitable for chipping like sawdust and shavings.

Table 5.—*Volume of unused wood industry residues produced in West Virginia in 1965 by geographic unit and subunit*[1]*, by type of material, and by hardwoods and softwoods*

(Thousand cubic feet, solid wood equivalent)

Geographic unit	Type of material								
	All forms			Coarse[2]			Fine[3]		
	Softwood	Hardwood	All species	Softwood	Hardwood	All species	Softwood	Hardwood	All species
Northern:									
Eastern subunit	46	2,187	2,233	26	1,270	1,296	20	917	937
Western subunit	151	5,138	5,289	86	2,986	3,072	65	2,152	2,217
Total	197	7,325	7,522	112	4,256	4,368	85	3,069	3,154
Southern:									
Eastern subunit	166	4,099	4,265	95	2,260	2,355	71	1,839	1,910
Western subunit	71	3,090	3,161	40	1,644	1,684	31	1,446	1,477
Total	237	7,189	7,426	135	3,904	4,039	102	3,285	3,387
Northwestern:									
Northern subunit	10	1,215	1,225	4	714	718	6	501	507
Southern subunit	31	1,908	1,939	19	1,112	1,131	12	796	808
Total	41	3,123	3,164	23	1,826	1,849	18	1,297	1,315
Total, all units	475	17,637	18,112	270	9,986	10,256	205	7,651	7,856

[1] See the explanation of geographic units in the next section of this report.

[2] Residues suitable for chipping like slabs and edgings and veneer cores.

[3] Residues not suitable for chipping like sawdust and shavings.

Table 6. — ***Number of employees, wages and salaries paid, and value added by manufacture in the wood-using industries and in all industries in West Virginia, 1965***

Industry	Number of employees	Wages and salaries paid	Value added by manufacture
All industries	117,026	$698,049,000	$1,887,148,000
(percent)	(100.0)	(100.0)	(100.0)
Primary lumber and wood products	5,236	14,669,000	24,939,000
(percent)	(4.5)	(2.1)	(1.3)
Secondary lumber and wood products	805	2,911,000	4,934,000
(percent)	(.7)	(.4)	(.3)
Pulp, paper, and paperboard	1,545	7,319,000	12,595,000
(percent)	(1.3)	(1.0)	(.7)
All wood-using industries[1]	7,586	24,899,000	42,468,000
(percent)	(6.5)	(3.5)	(2.3)

Source: U. S. Bureau of the Census, 1963 Census of Manufacturers, Publications MC 63(3)-49, MC 63(2)-24A, 24B, 24C, MC 63(2)-26A, 26B, 26C, 2nd MC 63(5)-3.4.

[1] Except wooden furniture.

Table 7.—***Number of employees, wages and salaries paid, and value added by manufacture in the wood-using industries of West Virginia by industry sector and geographic unit, 1965***

Industry Sector	Northern unit		Southern unit		Northwestern unit		Total, all West Virginia
	Eastern Panhandle subunit	Western subunit	Eastern subunit	Western subunit	Northern subunit	Southern subunit	
Primary lumber and wood products							
Number of employees	764	1,293	1,152	1,215	288	524	5,236
Wages and salaries paid	$2,084,000	$3,652,000	$3,212,000	$3,403,000	$ 807,000	$1,511,000	$14,669,000
Value added	$3,766,000	$6,135,000	$5,437,000	$5,786,000	$1,371,000	$2,444,000	$24,939,000
Secondary lumber and wood products							
Number of employees	117	254	111	17	68	238	805
Wages and salaries paid	$ 413,000	$ 932,000	$ 428,000	$ 52,000	$ 201,000	$ 885,000	$ 2,911,000
Value added	$ 706,000	$1,574,000	$ 745,000	$ 108,000	$ 316,000	$1,485,000	$ 4,934,000
Pulp, paper, and paperboard							
Number of employees	375	6	—	181	949	34	1,545
Wages and salaries paid	$1,896,000	$ 29,000	—	$ 864,000	$4,340,000	$ 190,000	$ 7,319,000
Value added	$4,320,000	50,000	—	$1,260,000	$6,499,000	$ 466,000	$12,595,000
Total, all wood industries (except wooden furniture)							
Number of employees	1,256	1,553	1,263	1,413	1,305	796	7,586
Wages and salaries paid	$4,393,000	$4,613,000	$3,640,000	$4,319,000	$5,348,000	$2,586,000	$24,899,000
Value added	$8,792,000	$7,759,000	$6,182,000	$7,154,000	$8,186,000	$4,395,000	$42,468,000

Source: U. S. Bureau of the Census, 1963 Census of Manufactures, Publications MC 63(3)-49, MC 63(2)-24A, 24B, 24C, MC 63(2)-26A, 26B, 26C, and MC 63(5)-3.4.

Output of Timber Products

SAWLOGS

Lumber Production

No one really knows when the first sawmill appeared in what is now West Virginia. By 1755 there were a few water-powered sawmills in the valleys of the Potomac and its tributaries. The first sawmill west of the Alleghenies, built at St. George in Tucker County in 1776 by John Minear, was a water-powered sash or "gate" mill. It is estimated that by 1835 there were 15 steam-powered circular sawmills in West Virginia (fig. 2).

Thus the lumber industry in West Virginia began somewhat laboriously, but it gained momentum. By 1875 the band saw had arrived and a boom in lumber production followed. The earliest

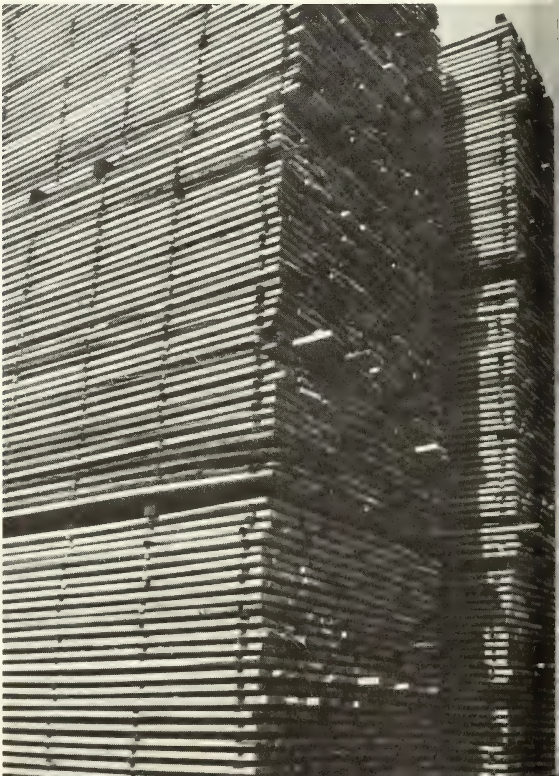

Figure 2.—West Virginia is a leading producer of hardwood lumber in the Northeast. Here rough hardwood lumber is being air-dried.

Table 8. — ***Lumber production, number of sawmills, and average production per mill in West Virginia for selected years, 1869-1965***[1]

Year	Lumber production	Sawmills	Average production per mill
	Thousand board feet	*No.*	*Thousand board feet*
1869	76,375	*	—
1879	180,112	*	—
1889	318,868	*	—
1899	778,051	568	1,370
1909	1,472,942	1,524	966
1914	1,118,480	913	1,225
1916	1,009,156	475	2,125
1919	763,103	736	1,037
1929	632,992	465	1,361
1932	135,283	124	1,091
1939	324,484	407	797
1942	588,456	1,558	378
1946	890,967	*	—
1949	469,383	*	—
1960	323,980	*	—
1965	475,369	505	941

* Not available.

[1] Sources: Steer, Henry B. Lumber Production in the United States, 1799-1946. U. S. Dep. Agr. Misc. Publ. 669. 1948.

Clarkson, Roy B., Tumult on the Mountains, p. 39. McClain Printing Company, Parsons, W. Va. 1964.

Northeastern Forest Experiment Station, Forest Service, U. S. Department of Agriculture, Upper Darby, Pa.

records of lumber production in West Virginia in 1869 show production estimated at 76 million board feet. Thirty years later, 1899, lumber production had increased to over 778 million board feet. In another 10 years West Virginia reached its peak of 1.5 billion feet. The boom was prolonged somewhat by World War I. But after the war a continuing decline in lumber production began. By 1960 lumber production had dropped to 324 million board feet. However, since then lumber production in the State has been increasing until by 1965 it reached 475 million board feet (table 8, fig. 3).

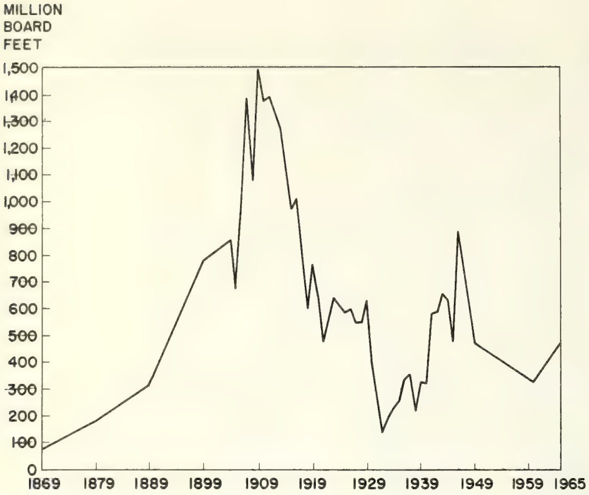

Figure 3 — Lumber production in West Virginia for selected years.

Lumber Production and Size of Sawmills

In 1965 approximately 505 sawmills were operating in West Virginia. These mills ranged in size from the smallest, which produced less than 16 thousand board feet, to the largest, which produced more than 25 million board feet during the year.

Twenty-six percent of these mills—133—produced more than 1 million board feet each. Their total production amounted to 398 million board feet, or 84 percent of the State's total lumber production (fig. 4). By comparison, those mills that produced under 100 thousand board feet accounted for 39 percent of the State's sawmills, but only 2 percent of its lumber production (fig. 5).

Table 9 shows the number of mills and the total production, both numerically and as a percent of the State total, for five sawmill-size classes, as well as the average production of each class. The average production of the State's sawmills was 941 thousand board feet in 1965. Note that the 16 largest mills averaged 10,489 thousand board feet while the 195 smallest mills averaged only 59 thousand board feet. It is unlikely that many of the small mills, remnants of earlier periods of high lumber production, will be replaced as they go out of production.

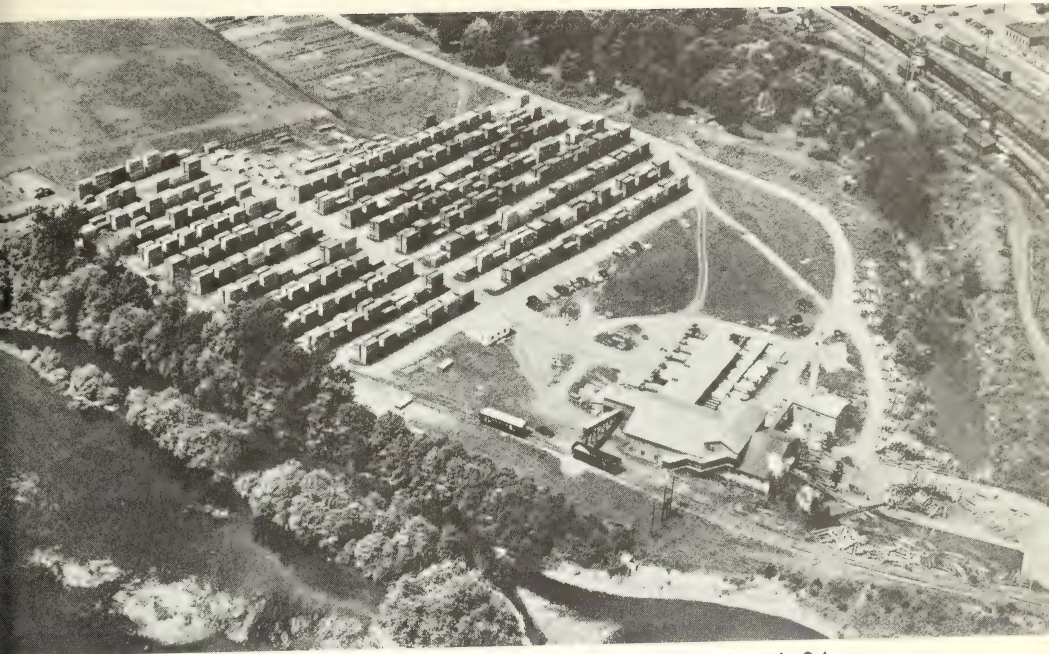

Figure 4.—Large sawmills like this one produced 84 percent of West Virginia's lumber production in 1965.

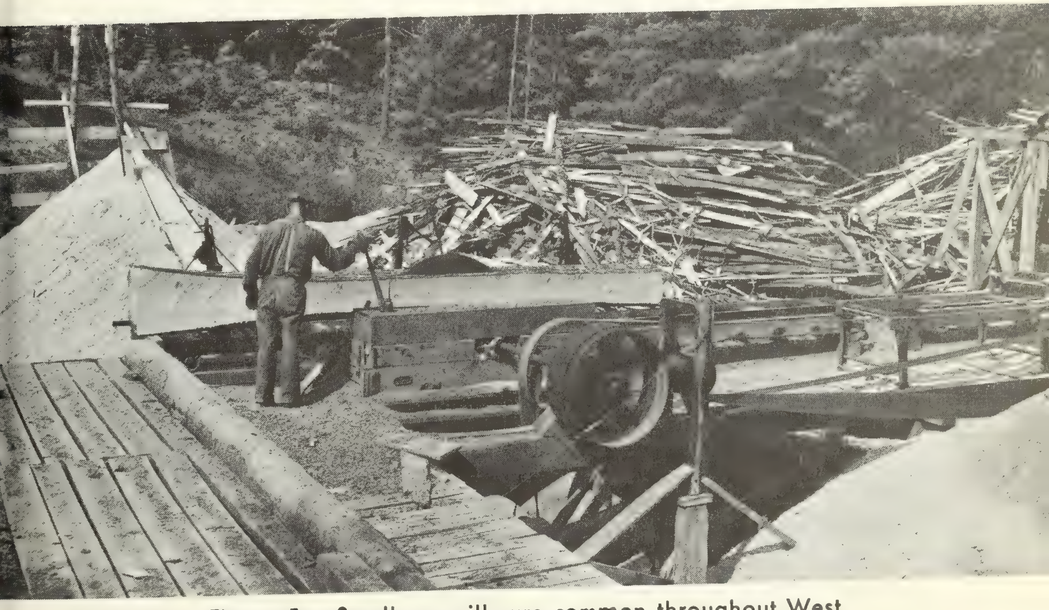

Figure 5.—Small sawmills are common throughout West Virginia. This portable mill is sawing white pine logs.

Table 9. — *Lumber production in West Virginia by sawmill-size class, 1965*

Sawmill-size class (thousand board feet)	Mills		Lumber production		
			Total		Average
	No.	*Percent of total*	*Thousand bd. ft.*	*Percent of total*	*Thousand bd. ft.*
5,000 or more	16	3	167,830	36	10,489
2,500 to 4,999	27	5	91,741	19	3,398
1,000 to 2,499	90	18	138,470	29	1,539
500 to 999	54	11	36,452	8	675
100 to 499	123	24	29,280	6	238
less than 100	195[1]	39	11,596	2	59
Total	505	100	475,369	100	941

[1] Approximate.

For this reason, we can expect fewer, but, on the average, larger sawmills in West Virginia in the future.

Sawmilling today is much as it was at the turn of the century. After the boom in lumber production an excess of mills stifled the advance of improved technology in sawmilling and depressed the average production of the State's sawmills. In 1965 the average sawmill in West Virginia produced 941 thousand board feet per year. Except for 1942 this is the lowest average production for any year for which we have estimates of total lumber production and the number of mills. By comparison, in 1916 the average production of sawmills reached its peak of 2,125 thousand board feet (fig. 6).

Sawlog Production

All sawmill operators listed in the *Directory of sawmill operators in West Virginia, 1963* were sent a questionnaire.[5] Mills producing less than 100 thousand board feet per year were sam-

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[5] This list was updated by personnel of the Division of Forestry of the West Virginia Department of Natural Resources and by the State Extension Forester.

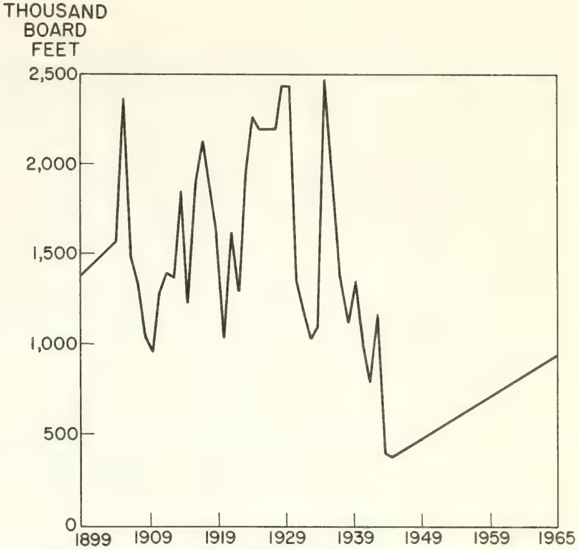

Figure 6.—Average annual production of sawmills in West Virginia for selected years.

pled lightly because they account for a very small portion of the State's lumber production.

A 100-percent field follow-up was made of all nonrespondent sawmills listed in the directory as sawing more than 1 million board feet annually. A sample of nonrespondent smaller mills was made also.

The questionnaire was used to solicit the total sawlog receipts of the mills by species and by county in which the logs were harvested. Also, data on the use, or non-use, of sawmill residues were gathered by means of the questionnaire.

In 1965 West Virginia produced nearly 491 million board feet of sawlogs (table 10). This is the highest production since 1943 when production was spurred by the war.

Of this total nearly 96 percent was hardwoods. Red oak accounted for nearly 29 percent of the 470 million feet of hardwood sawlogs produced. Yellow-poplar and white oak accounted for 19 and 11 percent, respectively, of the hardwood production (table 11).

The Southern Geographic Unit produced 46 percent—227 million board feet—of the State's sawlogs. Wyoming County, in the Southern Geographic Unit, produced more sawlogs than any other county—51,661.4 thousand board feet, or better than 10

Table 10. — *Production of sawlogs in West Virginia by species and geographic units, 1965*

(Thousand board feet)*

Species	Northern unit		Southern unit		Northwestern unit		State total
	Eastern panhandle subunit	Western subunit	Eastern subunit	Western subunit	Northern subunit	Southern subunit	
Softwoods:							
Yellow pine	3,128.4	281.0	192.8	537.0	114.7	301.8	4,555.7
White pine	1,687.5	12.0	3,140.1	710.0	31.3	16.7	5,597.6
Other softwoods	1.406.4	2,494.3	2,106.6	3,737.9	53.2	271.9	10,070.3
Total softwoods	6,222.3	2,787.3	5,439.5	4,984.9	199.2	590.4	20,223.6
Hardwoods:							
Ash	452.5	1,792.9	1,087.4	1,547.4	290.5	173.3	5,344.0
Basswood	1,103.5	7,209.1	4,250.0	6,006.1	211.2	1,032.1	19,812.0
Birch	451.5	3,210.5	2,636.0	306.2	5.3	4.7	6,614.2
Beech	1,235.6	9,193.3	7,687.3	5,180.5	163.3	1,909.5	25,369.5
Gum	110.3	753.0	1,080.3	1,683.4	65.8	55.0	3,747.8
Hickory	1,507.2	2,891.1	7,409.0	8,789.8	399.7	2,361.4	23,358.2
Maple, hard	5,271.7	19,700.3	11,464.9	6,847.1	811.0	375.7	44,470.7
Maple, soft	2,146.1	4,867.9	2,887.1	1,507.4	254.2	162.3	11,825.0
Oak, white	8,926.0	7,176.5	13,990.5	16,905.6	2,232.4	3,866.9	53,097.9
Oak, chestnut	3,988.8	3,635.4	4,866.6	5,741.5	770.3	675.7	19,678.3
Oak, red	21,880.4	26,203.8	33,320.2	25,601.6	10,594.5	16,790.0	134,390.5
Black cherry	4,542.0	8,948.3	4,675.7	281.2	1,020.0	18.2	19,485.4
Yellow-poplar	13,096.9	24,175.8	17,157.6	20,154.2	6,936.4	7,165.4	88,686.3
Walnut	883.8	317.2	263.8	722.3	341.5	1,296.7	3,825.3
Other hardwoods	4,078.2	2,601.3	2,141.8	758.7	369.5	839.6	10,789.1
Total hardwoods	69,674.5	122,676.4	114,918.2	102,033.0	24,465.6	36,726.5	470,494.2
Total, all species	75,896.8	125,463.7	120,357.7	107,017.9	24,664.8	37,316.9	490,717.8

* International ¼-inch rule.

Table 11. — *Production of sawlogs in West Virginia, by counties and geographic subunits, 1965*

(Thousand board feet)*

County	Softwood	Hardwood	All species
NORTHERN UNIT			
Eastern subunit			
Berkeley	463.7	2,632.5	3,096.2
Grant	1,870.5	7,496.7	9,367.2
Hampshire	369.2	5,278.2	5,647.4
Hardy	1,035.1	597.5	1,632.6
Jefferson	—	1,220.8	1,220.8
Mineral	463.6	8,239.3	8,702.9
Morgan	87.2	5,458.8	5,546.0
Pendleton	1,369.0	1,880.1	3,249.1
Preston	53.7	27,894.4	27,948.1
Tucker	510.3	8,976.2	9,486.5
Total	6,222.3	69,674.5	75,896.8
Western subunit			
Barbour	66.9	9,764.1	9,831.0
Braxton	83.0	7,018.6	7,101.6
Harrison	—	360.0	360.0
Lewis	50.0	2,336.0	2,386.0
Pocahontas	1,500.6	16,730.1	18,230.7
Randolph	579.8	42,900.0	43,479.8
Taylor	15.0	3,946.0	3,961.0
Upshur	—	8,832.3	8,832.3
Webster	492.0	30,789.3	31,281.3
Total	2,787.3	122,676.4	125,463.7
Unit total	9,009.6	192,350.9	201,360.5
SOUTHERN UNIT			
Eastern subunit			
Clay	521.2	9,520.6	10,041.8
Fayette	267.5	21,530.6	21,798.1
Greenbrier	802.6	43,020.1	43,822.7
Mercer	365.4	5,044.2	5,409.6
Monroe	633.5	5,884.7	6,518.2
Nicholas	571.7	25,027.7	25,599.4
Summers	2,277.6	4,890.3	7,167.9
Total	5,439.5	114,918.2	120,357.7

CONTINUED

Table 11 — *continued*

County	Softwood	Hardwood	All species
	Western subunit		
Boone	201.0	9,561.6	9,762.6
Kanawha	309.1	11,761.9	12,071.0
Logan	5.3	4,399.4	4,404.7
McDowell	1,075.2	8,045.1	9,120.3
Mingo	240.8	7,647.8	7,888.6
Raleigh	121.3	11,988.0	12,109.3
Wyoming	3,032.2	48,629.2	51,661.4
Total	4,984.9	102,033.0	107,017.9
Unit total	10,424.4	216,951.2	227,375.6
	NORTHWESTERN UNIT		
	Northern subunit		
Brooke	—	—	—
Doddridge	—	2,938.7	2,938.7
Hancock	—	—	—
Marion	13.2	2,645.8	2,659.0
Marshall	—	911.7	911.7
Monongalia	5.0	6,878.0	6,883.0
Ohio	—	—	—
Pleasants	—	—	—
Ritchie	32.9	2,261.6	2,294.5
Tyler	—	558.2	558.2
Wetzel	6.8	6,651.1	6,657.9
Wood	141.3	1,620.5	1,761.8
Total	199.2	24,465.6	24,664.8
	Southern subunit		
Cabell	21.3	741.9	763.2
Calhoun	—	2,796.7	2,796.7
Gilmer	4.5	2,208.1	2,212.6
Jackson	2.4	1,084.0	1,086.4
Lincoln	12.0	8,361.9	8,373.9
Mason	201.7	909.5	1,111.2
Putnam	—	269.6	269.6
Roane	42.6	7,874.2	7,916.8
Wayne	220.7	9,240.6	9,461.3
Wirt	85.2	3,240.0	3,325.2
Total	590.4	36,726.5	37,316.9
Unit total	789.6	61,192.1	61,981.7

* International ¼-inch rule.

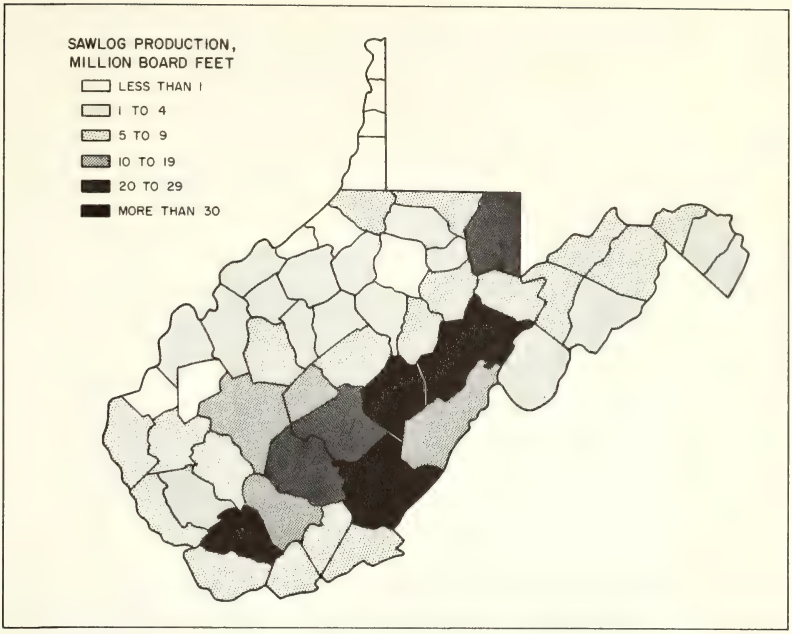

Figure 7.—Sawlog production in West Virginia, 1965, by counties.

percent of the State's total. Greenbrier and Randolph Counties each produced nearly 9 percent of the State's total (figs. 7 and 8).

Interstate Sawlog Shipments

In 1965 West Virginia shipped a greater volume of sawlogs out of the State for manufacture into lumber than it received. Five states—Virginia, Pennsylvania, Maryland, Ohio, and Kentucky—received a total of over 15 million board feet of sawlogs from West Virginia. Pennsylvania received more than any other state—nearly 12 million board feet. On the other hand, West Virginia received nearly 10 million board feet from these same states. More wood was shipped into West Virginia from Maryland than from any other state—4 million board feet. Thus, West Virginia showed a net shipment out of state of nearly 6 million board feet of sawlogs in 1965.

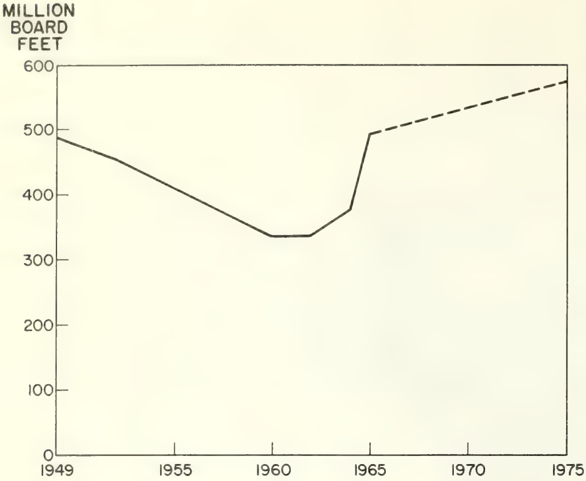

Figure 8.—Trend of sawlog production in West Virginia.

Value

The stumpage price is the price paid to the timber owner for standing timber by the individual who intends to harvest it. The harvester or logging contractor then receives a price from the sawmill operator when he delivers the logs to the mill. This is called the delivered price.

Based on a weighted average price for each species, the total stumpage value of sawlogs produced in West Virginia in 1965 was $9,400,000. The delivered value of these logs was $27,110,000 (table 12).

Both stumpage and delivered prices vary considerably by species. Stumpage prices in 1965 ranged from as low as $2 per thousand board feet for beech to a high of $60 or more per thousand board feet for black cherry, black walnut, and red oak. The average stumpage price paid was $20.17 per thousand board feet. Delivered prices show a similar range, from a low of $18 for beech to a high of $164 for black walnut. The average delivered price of sawlogs was $57.15 per thousand board feet.

Projected Sawlog Production

Sawlog production fell from 470 million board feet in 1949 to 320 million board feet in 1960 and then gained sharply from

Table 12. — *Estimated stumpage value and estimated value delivered to the mill of sawlogs cut in West Virginia, by geographic unit, 1965*

(In thousands of dollars)

Geographic unit and subunit	Estimated stumpage value	Estimated value delivered to the mill
Northern unit:		
Eastern panhandle subunit	$1,537	$4,399
Western subunit	$2,254	$7,105
Southern unit:		
Eastern subunit	$2,403	$6,574
Western subunit	$1,986	$5,709
Northwestern unit:		
Northern subunit	$ 504	$1,351
Southern subunit	$ 716	$1,972
State total	$9,400	$27,110

[1] These estimated values were calculated by applying the weighted average price of various species to the sawlog cut for each geographic subunit. Prices were calculated using the West Virginia Forest Products Marketing Information Bulletins Vol. 6, Nos. 1, 2, and 3, published by the West Virginia Department of Agriculture.

1960 to 1965. Over these 16 years the net increase has been about 0.25 percent per year.

To assume that this 0.25 percent overall trend is the actual trend for projection purposes would result in an overly conservative projection. On the other hand, to assume that the nearly 9 percent annual rate experienced between 1960 and 1965 is the actual rate would result in an over-enthusiastic projection. Because sawlog production in West Virginia has increased at a faster rate than the approximate 1 percent national rate of growth, we have selected a 1.5 percent annual rate of increase that we feel is realistic in the long run. Based on this 1.5 percent rate, sawlog production can be expected to reach 529 million board feet by 1970 and 570 million board feet by 1975. The sawtimber supply in West Virginia will probably be sufficient to meet this demand.

VENEER

A 100-percent canvass of veneer log brokers and buyers was made using the same questionnaire sent to sawmill operators.

Production

The veneer industry in West Virginia is small. In 1965 the total production of veneer logs in West Virginia was 4,601 thousand board feet, down from 6,982 thousand board feet in 1963 (figs. 9 and 10).

The most commonly utilized species for veneer was yellow-poplar—1.4 million board feet; the second most commonly used was red oak—1.1 million board feet; and third was hickory—0.7 million board feet.

Figure 9.—Veneer is trimmed after being sliced. In 1965 West Virginia veneer manufacturers consumed nearly 6.4 million board feet of veneer logs.

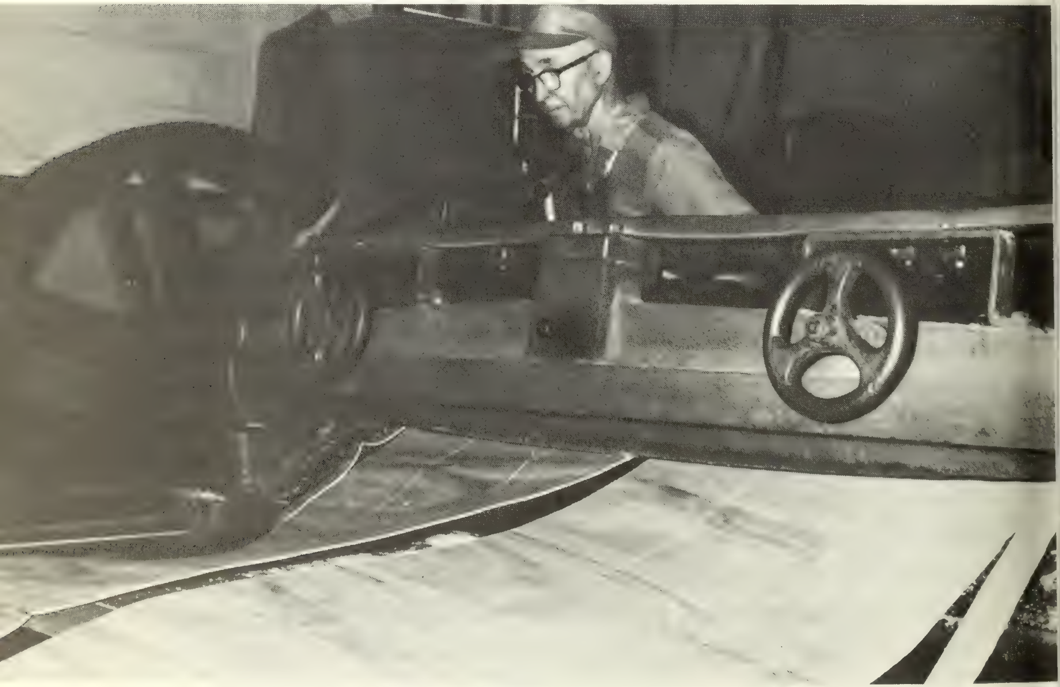

Table 13. — ***Veneer logs cut in West Virginia, by species and by state or country of manufacture, 1965***

(Thousand board feet)

Species	Cut in West Virginia	Processed in:						
		West Virginia	Indiana	Ohio	Penn-sylvania	Virginia	Canada	Total exported
Ash	99	11	—	—	—	87	1	88
Basswood	241	241	—	—	—	—	—	—
Elm	28	—	—	28	—	—	—	28
Gum	11	—	—	11	—	—	—	11
Hickory	695	549	100	—	—	46	—	146
Maple, hard	34	34	—	—	—	—	—	—
Maple, soft	23	23	—	—	—	—	—	—
Oaks, white	131	64	—	—	—	40	27	67
Oak, chestnut	4	—	—	—	—	—	4	4
Oak, red	1,146	287	—	—	756	103	—	859
Black cherry	43	40	—	—	3	—	—	3
Yellow-poplar	1,439	1,168	—	230	—	41	—	271
Walnut	636	70	3	517	—	11	35	566
Other	71	14	—	57	—	—	—	57
Total, all species	4,601	2,501	103	843	759	328	67	2,100

Nearly 46 percent of the veneer logs produced in West Virginia is shipped to other states and countries for manufacture into veneer. However, West Virginia veneer manufacturers more than replace these exported logs with logs received from other states. Thus, while West Virginia cut 4,601 thousand board feet in 1965 and shipped 2,100 thousand board feet out of the State (table

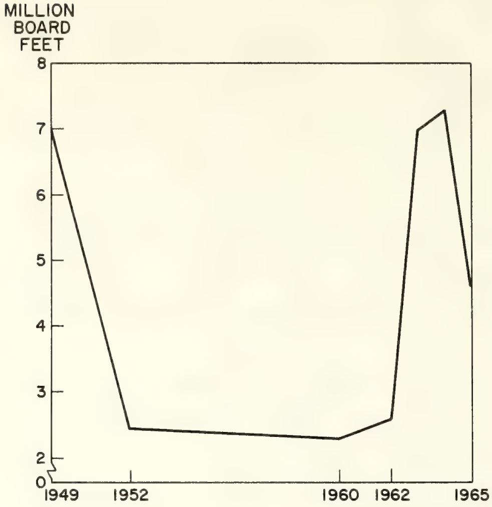

Figure 10.—Veneer log production in West Virginia, 1949-65.

13), West Virginia veneer manufacturers received 3,852 thousand feet of logs from other states to make the State's total veneer log consumption 6,353 thousand board feet (table 14). This phenomenon of relatively large cross-boundary movement happens because veneer plants generally specialize in particular types of veneers and in particular species; therefore veneer logs frequently move considerabe distances and often through several dealers and handlers before they finally are converted into veneers.

Value

Prices for veneer-quality logs vary substantially with the species and the quality of the logs. Stumpage prices range from under $100 per thousand board feet for species like yellow-poplar to over $900 for top-quality black walnut logs. Generally speaking, one could use $100 per thousand board feet as an average for all species except black walnut, black cherry, and white oak. These last two bring up to $175 per thousand board feet, and black walnut prices average about $800. Because prices vary greatly and detailed price quotations are lacking, an estimate of the stumpage or delivered log value of the West Virginia veneer log harvest was not made.

Because the industry is erratic we did not attempt to project the future production of veneer logs. However, the forest survey

Table 14. — *Veneer log consumption in West Virginia by species, produced from logs cut in and out of state, 1965*

(Thousand board feet)

Species	Total	Logs cut in West Virginia	Logs cut in other states
Ash	103	11	92
Basswood	264	241	23
Elm	—	—	—
Gum	—	—	—
Hickory	1,855	549	1,306
Maple, hard	34	34	—
Maple, soft	23	23	—
Oaks, white	371	64	307
Oak, chestnut	—	—	—
Oak, red	1,437	287	1,150
Black cherry	468	40	428
Yellow-poplar	1,454	1,168	286
Walnut	289	70	219
Other	55	14	41
Total, all species	6,353	2,501	3,852

of West Virginia (1961) reports 11,877 million board feet of hardwoods in trees 17 inches d.b.h. and larger and 2,861 million board feet of hardwood in grade-1 standard-lumber logs.[1] Although not all of this material is veneer-log quality or is available to veneer manufacturers, we can reasonably conclude that the production of veneer logs could be increased substantially in West Virginia.

COOPERAGE

A 100-percent canvass of all known producers of cooperage stock and a 100-percent field follow-up of all nonrespondents were conducted.

The cooperage industry in West Virginia consumed less than 1 percent of the 1965 timber harvest and only 8 percent of the white oak harvest. The industry is erratic (fig. 11 and table 15).

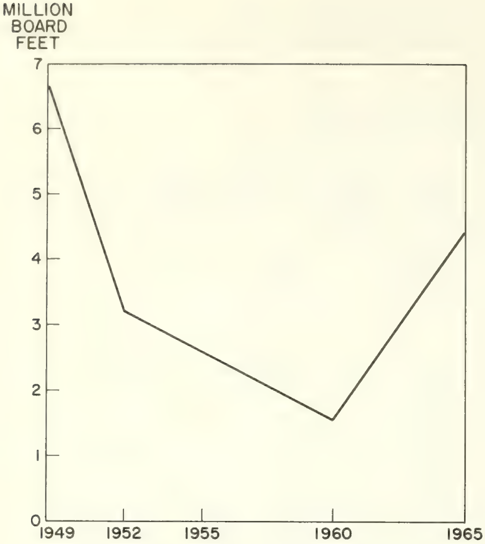

Figure 11. — Cooperage log and bolt production in West Virginia, 1949-65.

In 1965 the reported production of cooperage logs and bolts was 4.4 million board feet. All this material was white oak for tight cooperage. Because this industry requires high-quality material, the average value of 1 thousand board feet of cooperage quality logs and bolts delivered to the mill is estimated at $130. Thus the total value of cooperage material produced in West Virginia in 1965 was estimated to be $575,380,[6] delivered to the mill (fig. 12).

The forest survey of West Virginia indicates that at that time there were 1,032 million board feet of white oak in trees 17 inches d.b.h. or larger in the State.[1] Although more exact figures are not available, two-thirds or more of this volume is estimated to be of acceptable cooperage quality. This volume, nearly 700 million board feet, is scattered throughout the State. And of course not all of it will be consumed by cooperage mills. Other industries, like veneer mills and lumber mills, compete with cooperage mills for this material. However, a sufficient volume of cooperage material probably will be available in West Virginia to meet and exceed current and prospective demands.

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[6] This estimated price was calculated by taking the weighted average of #1, #2, and heading bolts as reported by the West Virginia Department of Agriculture in WEST VIRGINIA FOREST PRODUCTS MARKETING INFORMATION Vol. 6, Nos. 1, 2, and 3.

Table 15. — *Cooperage log and bolt production in West Virginia, 1949-1965*

(Thousand board feet)

Year	Softwood	Hardwood	Total
1949	—	6,700	6,700
1952	—	3,192	3,192
1960	—	1,550	1,550
1965	—	4,426	4,426

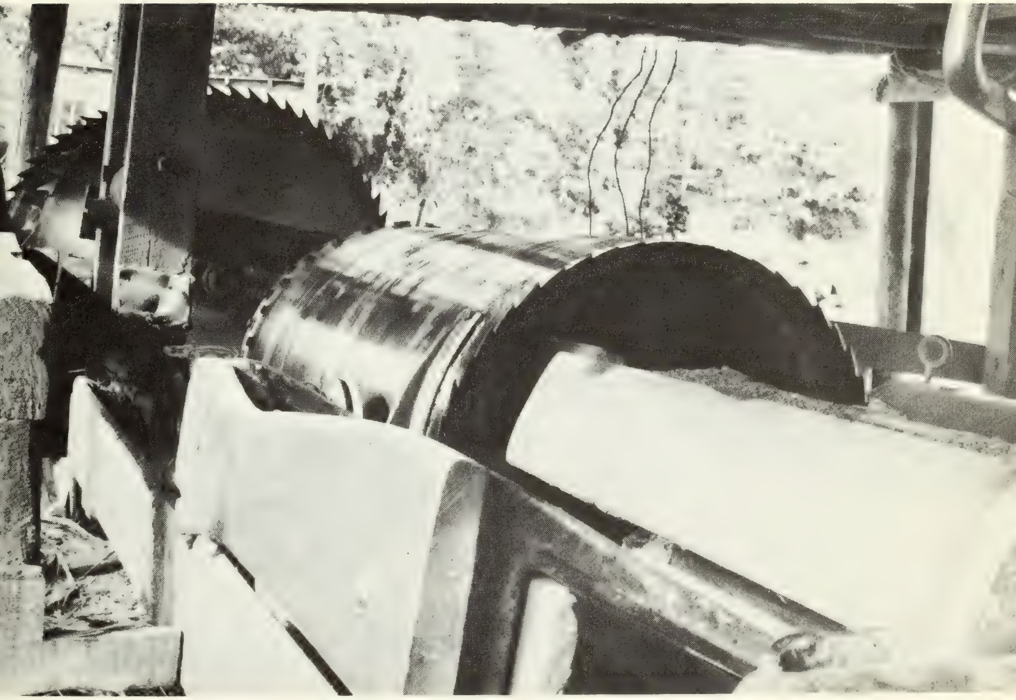

Figure 12.—A white oak stave leaves the saw. In 1965 West Virginia produced $575,380 worth of white oak cooperage bolts for the tight cooperage industry.

PULPWOOD

Pulpwood data were compiled as part of the annual canvass of pulpwood production in the 14 states of the Northeast. This canvass of woodpulp mills solicits the amount of pulpwood received at mills by the county in which it was cut and by species. Also included in this canvass is the amount of wood chips produced for woodpulp and the volume of miscellaneous wood-industry residues used in woodpulp manufacture by state. The results of this canvass for the entire 14 states of the Northeastern area are published annually by the Northeastern Forest Experiment Station.[7]

In 1965 the production of round pulpwood in West Virginia totaled 319,300 cords (fig. 13). Of this total 32 percent was softwood and 68 percent hardwood (tables 16 and 17). This amount put West Virginia in fourth place among the 14 North-

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[7] Kingsley, Neal P. PULPWOOD PRODUCTION IN THE NORTHEAST, 1963. U. S. Forest Serv. Resource Bull. NE-3. 26 pp., illus. NE. Forest Exp. Sta., Upper Darby, Pa. 1966.

Kingsley, Neal P. PULPWOOD PRODUCTION IN THE NORTHEAST, 1964. U. S. Forest Serv. Resource Bull. NE-5. 27 pp., illus. NE. Forest Exp. Sta., Upper Darby, Pa. 1967.

Kingsley, Neal P. and David R. Dickson. PULPWOOD PRODUCTION IN THE NORTHEAST, 1965. U. S. Forest Serv. Resource Bull. NE-6. 36 pp., illus. NE. Forest Exp. Sta., Upper Darby, Pa. 1967.

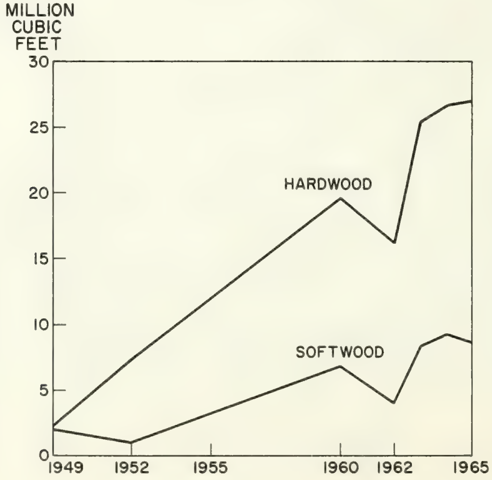

Figure 13.—Round pulpwood production in West Virginia, 1949-65.

Table 16.—*Round pulpwood production in West Virginia by geographic units and subunits, and by species group, 1965*

(In rough cords)

Geographic unit	Spruce and fir	Hemlock-tamarack	Pines	All softwoods	Aspen-yellow-poplar	Oak-hickory	Other hardwoods	All hardwoods	Total
Northern:									
Eastern subunit	—	—	66,900	66,900	5,200	68,100	58,200	131,500	198,400
Western subunit	—	100	1,400	1,500	500	4,500	9,600	14,600	16,100
Total	—	100	68,300	68,400	5,700	72,600	67,800	146,100	214,500
Southern:									
Eastern subunit	100	1,100	6,000	7,200	900	2,900	61,800	65,600	72,800
Western subunit	—	—	100	100	—	—	500	500	600
Total	100	1,100	6,100	7,300	900	2,900	62,300	66,100	73,400
Northwestern:									
Northern subunit	—	—	6,500	6,500	—	500	1,200	1,700	8,200
Southern subunit	—	—	20,100	20,100	100	1,200	1,800	3,100	23,200
Total	—	—	26,600	26,600	100	1,700	3,000	4.800	31,400
State total	100	1,200	101,000	102,300	6,700	77,200	133,100	217,000	319,300

Table 17. — *Round pulpwood production in West Virginia by geographic units and counties, and by species groups, 1965*

(Thousand rough cords)

County	Softwoods				Hardwoods				All species
	Spruce-fir	Hemlock-tamarack	Pine	Total	Aspen-yellow-poplar	Oak-hickory	Other	Total	
				NORTHERN GEOGRAPHIC UNIT					
				Eastern subunit					
Berkeley	—	—	9.2	9.2	—	2.1	0.3	2.4	11.6
Grant	—	—	4.3	4.3	1.3	12.1	11.0	24.4	28.7
Hampshire	—	—	20.6	20.6	1.6	16.7	14.8	33.1	53.7
Hardy	—	—	10.0	10.0	.1	10.6	10.5	21.2	31.2
Jefferson	—	—	.2	.2	*	.1	.1	.2	.4
Mineral	—	—	5.5	5.5	1.4	13.9	12.6	27.9	33.4
Morgan	—	—	13.2	13.2	.1	5.7	1.4	7.2	20.4
Pendleton	—	*	3.7	3.7	.3	2.7	3.8	6.8	10.5
Preston	—	—	—	—	.2	1.8	1.6	3.6	3.6
Tucker	—	—	.2	.2	.2	2.4	2.1	4.7	4.9
Total	—	—	66.9	66.9	5.2	68.1	58.2	131.5	198.4

Western subunit

Barbour	—	—	—	—	—	—	—	—	—
Braxton	—	—	—	—	*	*	*	*	*
Harrison	—	—	*	*	*	*	*	*	*
Lewis	—	—	*	*	—	—	—	—	*
Pocahontas	*	0.1	1.3	1.4	0.4	3.4	8.6	12.4	13.8
Randolph	—	—	.1	.1	.1	1.1	1.0	2.2	2.3
Taylor	—	—	—	—	*	*	*	*	*
Upshur	—	—	—	—	—	—	—	—	—
Webster	—	—	*	*	—	—	—	—	*
Total	—	0.1	1.4	1.5	0.5	4.5	9.6	14.6	16.1
Unit total	—	0.1	68.3	68.4	5.7	72.6	67.8	146.1	214.5

SOUTHERN GEOGRAPHIC UNIT

Eastern subunit

Clay	—	—	—	—	—	—	—	—	—
Fayette	—	—	*	*	*	*	0.2	0.2	0.2
Greenbrier	*	0.5	2.5	3.0	0.4	1.4	32.0	33.8	36.8
Mercer	—	—	—	—	—	—	—	—	—
Monroe	0.1	.6	3.3	4.0	.5	1.2	28.6	30.3	34.3
Nicholas	—	—	.1	.1	*	.3	.2	.5	.6
Summers	*	*	.1	.1	*	*	.8	.8	.9
Total	0.1	1.1	6.0	7.2	0.9	2.9	61.8	65.6	72.8

CONTINUED

Table 17 — *continued*

County	Softwoods				Hardwoods				
	Spruce-fir	Hemlock-tamarack	Pine	Total	Aspen-yellow-poplar	Oak-hickory	Other	Total	All species
				Western subunit					
Boone	—	*	*	*	*	*	0.5	0.5	0.5
Kanawha	—	—	0.1	0.1	—	*	*	*	.1
Logan	—	—	—	—	—	—	—	—	—
McDowell	—	—	—	—	—	—	—	—	—
Mingo	—	—	—	—	—	—	—	—	—
Raleigh	—	—	—	—	—	*	*	*	*
Wyoming	—	—	—	—	—	—	—	—	—
Total	—	—	0.1	0.1	—	—	0.5	0.5	0.6
Unit total	0.1	1.1	6.1	7.3	0.9	2.9	62.3	66.1	73.4
				NORTHWESTERN GEOGRAPHIC UNIT					
				Northern subunit					
Brooke	—	—	—	—	—	—	—	—	—
Doddridge	—	—	*	*	*	*	*	*	*
Hancock	—	—	—	—	—	*	*	*	*
Marion	—	—	—	—	—	—	—	—	—

Marshall	—	—	*	*	—	—	—	—	*
Monongalia	—	—	*	*	—	—	—	—	*
Ohio	—	—	—	—	*	*	*	*	*
Pleasants	—	—	0.2	0.2	*	*	*	*	0.2
Ritchie	—	—	1.7	1.7	*	0.2	0.2	0.4	2.1
Tyler	—	—	—	—	—	—	—	—	—
Wetzel	—	—	—	—	—	—	—	—	—
Wood	—	—	4.6	4.6	*	.3	1.0	1.3	5.9
Total	—	—	6.5	6.5	—	0.5	1.2	1.7	8.2
				Southern subunit					
Cabell	—	—	0.3	0.3	—	—	—	—	0.3
Calhoun	—	—	.2	.2	—	*	*	*	.2
Gilmer	—	—	*	*	*	0.1	*	0.1	.1
Jackson	—	—	1.3	1.3	*	.1	0.2	.3	1.6
Lincoln	—	—	*	*	—	—	—	—	*
Mason	—	—	6.8	6.8	0.1	.6	1.2	1.9	8.7
Putnam	—	—	5.6	5.6	*	*	*	*	5.6
Roane	—	—	1.2	1.2	—	.1	.1	.2	1.4
Wayne	—	—	—	—	—	*	*	*	*
Wirt	—	—	4.7	4.7	*	.3	.3	.6	5.3
Total	—	—	20.1	20.1	0.1	1.2	1.8	3.1	23.2
Unit total	—	—	26.6	26.6	0.1	1.7	3.0	4.8	31.4

* Less than 50 cords.

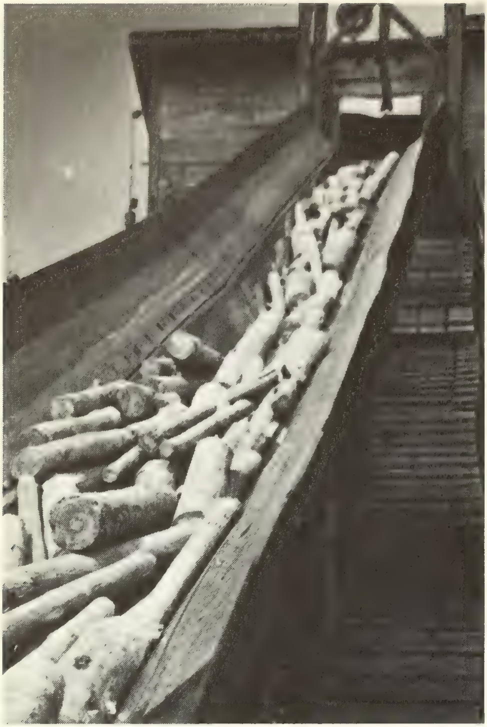

Figure 14. — Debarked pulpwood bolts are conveyed to the chipper before being manufactured into woodpulp. West Virginia is one of the leading pulpwood-producing states in the Northeast.

eastern States. West Virginia led fifth-ranked Ohio by 46,800 cords and fell 51,600 cords behind third-place New York. All of this pulpwood was shipped out of the State, principally to Virginia, Ohio, and Maryland (fig. 14).

The use of wood chips from wood-industry residues, and long logs for pulpwood has grown remarkably in recent years. West Virginia is no exception to this trend. In 1965 West Virginia produced the equivalent of 92,400 cords of wood chips for woodpulp. Thus West Virginia placed second among the 14 states in chip production; Maine was first with 129,700 cords. In 1963 West Virginia's total wood chip production was only 38,600 cords.

Pulpwood production in West Virginia has shown outstanding growth in recent years. The 1965 production of pulpwood was nearly 7 times that of 1949—27,141 thousand cubic feet compared to 4,200 thousand cubic feet (table 18).

Table 18. — *West Virginia pulpwood production, 1949-1965*

(Thousand cubic feet)

Year	Softwoods	Hardwoods	Total
1949	2,000	2,200	4,200
1952	1,028	6,439	7,467
1960	6,972	12,708	19,680
1962	4,095	12,125	16,220
1963	8,483	17,034	25,517
1964	9,316	17,400	26,716
1965	8,696	18,445	27,141

To project pulpwood production in any region is hazardous. The construction of a new mill and abrupt changes in technology, which cannot be foreseen easily, can drastically alter production and make the projection obsolete. However, if we make certain assumptions we can project production in this important industry.

In our projections we made three basic assumptions. First, that West Virginia's total production of pulpwood will continue to have the same relationship to the total production of woodpulp in surrounding states; second, that the 4-percent-per-year decrease in the number of cords required per ton of woodpulp production, which has been evident in recent years, will continue; third, that the timber resource of West Virginia is not a limiting factor in pulpwood production.

Our projections (fig. 15) indicate an annual total production of approximately 675 thousand cords by 1970 and 925 thousand cords by 1975. How much of this total will be in the form of wood chips produced from other wood industry residues is difficult to access. However, based on recent trends, wood chips could conceivably account for 30 percent or more of the total production by 1975.

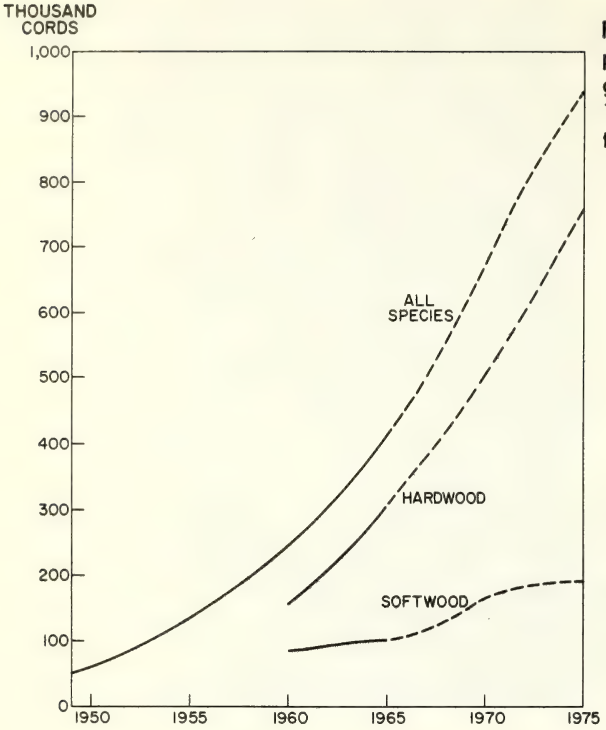

Figure 15. — Pulpwood production in West Virginia from all sources 1949-65, and projection to 1975.

POLES

In 1965 West Virginia produced one thousand poles for a total of 12 thousand cubic feet. All this material was softwood. Because the volume of this material is insignificant, to establish a value or attempt a projection of future production would be meaningless.

This estimate was developed by using a 100-percent canvass of all known procedures of poles and a 100-percent field follow-up of all non-respondents.

MINE TIMBERS

Because mine-timber production is sporadic and highly fragmented in West Virginia, a complete list of mine-timber producers for use in a mail canvass could not be compiled (fig. 16). Therefore a set of factors for estimating the use of round, split, and hewn mine timbers (mine props) per ton of coal were applied to underground mine production in each county in 1965.[8] The factors, 0.00669 cubic feet of softwood and 0.07534 cubic feet of hardwood per ton, were developed from a 1962 study of wood used in mines.

We had to make two assumptions: first, that these factors had not significantly changed from 1962 to 1965; and second, that mine-timber production in any county is fairly well correlated with coal production from underground mines in the county. Where this correlation was weak, we further assumed that these weaknesses would be minimized by grouping counties.

The production of round, hewn, and split mine timbers in West Virginia totaled just over 11 million cubic feet in 1965. Only 898 thousand cubic feet of this material was softwood (table 19). In addition to the 11 million cubic feet of round, hewn, and spilt mine timbers, West Virginia's underground mines also used 4 million cubic feet of lumber, sawed ties, and timbers.

At an average stumpage price of 5.5 cents per piece or $4.40 per cord, the 11 million cubic feet of mine props was worth $605,000 to landowners. The value of this material delivered to

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[8] West Virginia Department of Mines Annual Report, 1965, p. 129.

Figure 16.—Many sawmills like this one produce mine timbers and ties as well as lumber.

Table 19.—***Round, hewn, and split mine timber production, by softwoods and hardwoods, and coal production from underground mines in West Virginia, 1965***

Geographic unit and subunit	Coal production[1] from underground mines	Softwoods	Hardwoods	Total
	Tons	*Thousand cubic feet*		
Northern:				
Eastern panhandle subunit	4,228,781	28.2	318.6	346.8
Western subunit	10,723,547	71.7	807.8	879.5
Southern:				
Eastern subunit	15,071,712	100.8	1,135.5	1,236.3
Western subunit	75,494,903	504.9	5,687.7	6,192.6
Northwestern:				
Northern subunit	27,499,942	184.0	2,071.8	2,255.8
Southern subunit	1,233,459	8.3	93.0	101.3
Total, all units	134,252,344	897.9	10,114.4	11,012.3

[1] West Virginia Department of Mines annual report, 1965.

the mines was estimated at $892,000.30, an average price of 8.1 cents per cubic foot or $6.48 per cord.[9]

The production of mine props generally can be expected to follow the trend of the production of coal from underground mines. This segment of the coal-mining industry has shown moderate increases in recent years. Thus if present trends continue, round, split, and hewn mine-timber production can be expected to approach 15 million cubic feet by 1970 and to be between 18 and 19 million cubic feet by 1975.

CHARCOAL

The charcoal industry in West Virginia consists of seven operating plants. Six of these plants consume an estimated 76,800 cords of wood (fig. 17). Of this material 62,300 cords is roundwood and 14,500 cords is sawmill residues, principally slabs and edgings. The seventh firm produces charcoal from wood bark,

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[9] This estimated price was calculated by taking the weighted average prices of various sizes of mine props as reported by the West Virginia Department of Agriculture in WEST VIRGINIA FOREST PRODUCTS MARKETING INFORMATION, Vol. 6, Nos. 1, 2, and 3.

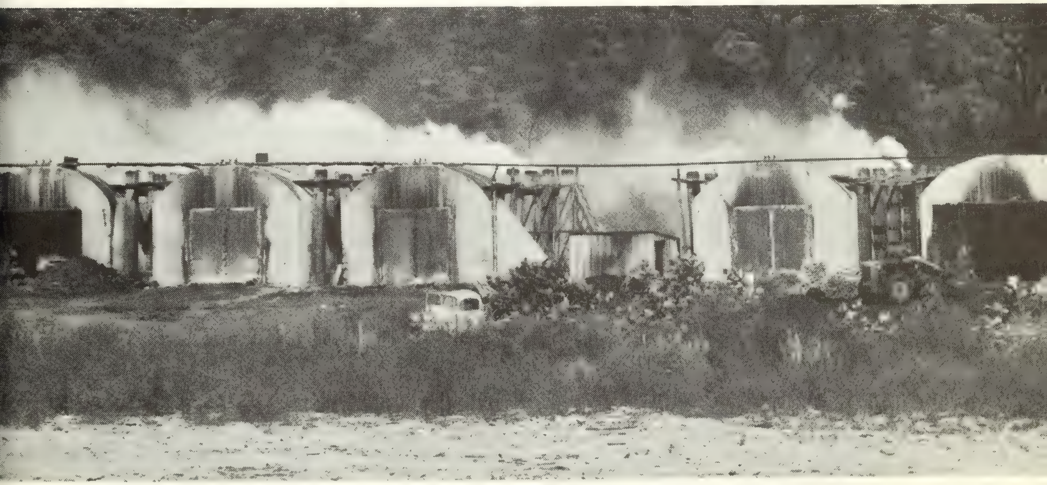

Figure 17.—Charcoal kilns in operation. In 1965 the West Virginia charcoal industry consumed nearly 77 thousand cords of wood.

and its production is not included in the totals. Most of West Virginia's charcoal plants produce raw charcoal, but two of them also produce charcoal briquettes. The wood and residues consumed by West Virginia's charcoal plants are valued at $644,700 delivered to the plant.

This estimate of charcoal production was developed by consultation with several people who are familiar with the industry in West Virginia.

FENCING

Rustic Fencing

The rustic fencing industry in West Virginia consists of 13 firms. The mail canvass of these producers showed that in 1965 they produced 246 thousand posts and 477 thousand rails. This volume amounts to 990 thousand cubic feet (table 20).

The most commonly used species is dead American chestnut (*Castanea dentata*)—534 thousand cubic feet (fig. 18). This is material cut from trees killed by the chestnut blight that swept through the range of the American chestnut. The second most commonly used species is black locust—295 thousand cubic feet. Sassafras is the third commonly used species—147 thousand cubic feet. This species is considered a noncommercial species because it seldom reaches sufficient size for most commercial uses. Recently some red spruce has been used for rustic fencing—14 thousand cubic feet.

Table 20. — *Rustic fencing production in West Virginia, by species, 1965*

Species	Posts	Rails	Total	Posts	Rails	Total
	Thousand pieces			*Thousand cubic feet*		
Spruce	8	—	8	14	—	14
Sassafras	36	72	108	61	86	147
Black locust	72	144	216	122	173	295
Chestnut	130	261	391	221	313	534
Total, all species	246	477	723	418	572	990

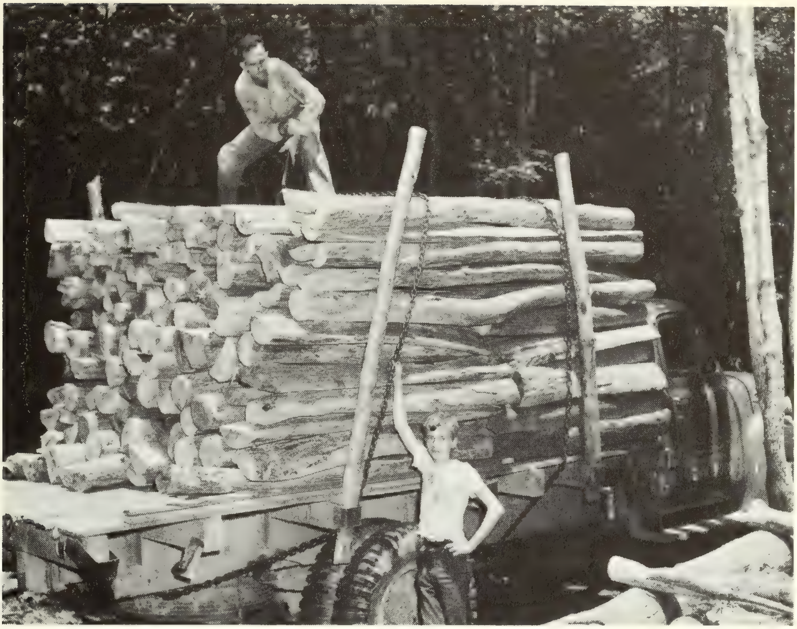

Figure 18.—A truckload of chestnut fence posts and rails. Fifty-four percent of the timber cut for rustic fencing in West Virginia in 1965 was blight-killed American chestnut.

Because the chestnut used in rustic fencing is dead and the sassafras is considered a noncommercial species, no more than 309 thousand cubic feet could have been cut from growing-stock material. Of this 309 thousand cubic feet it is doubtful that more than 75 percent was cut from trees 5 inches d.b.h. and larger. Therefore, in all probability, out of 990 thousand cubic feet, only about 230 thousand cubic feet were removed from growing stock.

Much of the material used to manufacture rustic fencing is cut by farmers and other rural residents during slack periods. For this reason prices for fencing material are quoted two ways—at the farm and delivered. The at-the-farm price differs from stumpage price because the material already has been cut and is just awaiting delivery to the manufacturer. In 1965 the at-the-farm price for rails was 27 cents per piece, and for posts 26 cents per piece. At these prices the total at-the-farm value of this material was $190,440. Delivered prices were 32 cents for rails and 49 cents for posts. At these prices the delivered value of the material was $312,450.

Because past production data on rustic fencing are scarce we cannot project the future of this industry. However, it does appear certain that the rustic-fencing industry in West Virginia cannot continue to grow unless the consumer will accept rustic fencing made with species other than chestnut.

Other Fencing

In addition to the 990 cubic feet of rustic fence material, West Virginia also produced 1,679 thousand cubic feet of posts for other purposes. These are principally fence posts for farm use. If one assumes the same value as for rustic fence posts, the value of this production is $302,120 at the farm. This estimate of other fencing was developed as part of the fuelwood canvass.

FUELWOOD

A survey to determine the production of fuelwood in any area poses many special problems. Fuelwood production is usually a part-time endeavor, even for those producing fuelwood for sale. Many questions arise about this industry: Who are these producers? How much do they cut from trees that are not on forest land? How much is cut from dead trees or portions of trees that other users will not or cannot utilize? And how much of the wood consumed as fuel is actually residues from other wood-using industries, particularly from sawmill slabs and edgings? For these reasons a door-to-door canvass of randomly selected homes and farms was conducted to develop an estimate of fuelwood production.

This canvass utilized the Master Sample of Agriculture, which is a predetermined segmenting of predominantly rural areas in the United States. A particular size sample of these areas can be selected based on the number of segments and the total of the assigned weights. In West Virginia a total of 32 sample segments was taken. These segments constituted a 0.5-percent sample of the State. This size of sample gave a calculated sampling error of 20 percent for the total. Stated another way, this means that, if the

Table 21.—*Fuelwood production in West Virginia, 1965 from growing stock by species, from nongrowing stock, and from wood industry residues*

Kind of timber	Volume	
	Cords	*Thousand cubic feet*
FROM GROWING STOCK *(trees 5 inches d.b.h. or larger)*		
Softwoods:		
Yellow pines	1,278	102
White pine	—	—
Other softwoods:	—	—
Total softwoods	1,278	102
Hardwoods:		
Red oaks	6,190	495
White oaks	5,334	427
Yellow-poplar	2,530	202
Hickories	2,195	176
Chestnut oak	1,499	120
Locust	1,111	89
All other hardwoods	7,151	572
Total hardwoods	26,010	2,081
Total, from growing-stock sources	27,288	2,183
FROM NON-GROWING STOCK SOURCES		
Cull trees and limbs over 4 inches d.i.b.	6,595	528
Dead trees	10,263	821
Upper stems and limbs under 4 inches d.i.b. and trees under 5 inches d.b.h.	10,360	828
Noncommercial species and trees from nonforest land	864	69
Total, non-growing-stock sources	28,082	2,246
From wood-industry residues	100,758	8,061
Total from all sources	156,128	12,490

same procedure were repeated, two out of three times the resulting total would be within 20 percent of the original total.

The results of this survey showed that 27,288 cords of growing-stock material and 28,082 cords of non-growing-stock material were used for fuelwood—a total of 55,340 cords of roundwood. In addition to this, 100,758 cords came from wood-industry residues. Of the roundwood 26 percent came from sawtimber-size trees and 74 percent from poletimber-size trees (table 21).

Once a major fuel in rural areas, wood is used less and less for home heating. In many areas, particularly suburban areas, more fuelwood is undoubtedly consumed as a luxury item—fireplace logs—than as household fuel. And in rural areas of West Virginia, fuelwood consumption is low because coal is as cheap as wood and more easily obtained. Undoubtedly fuelwood production will continue to decline in West Virginia. What the rate of this decline will be is in question because the actual production of fuelwood is at best difficult to determine.

The value of fuelwood production is as difficult to assess as production. Substantial quantities of roundwood are produced and consumed without ever changing hands in the market. However, in determining this value one might apply prices for mine timbers. This, at best, undoubtedly would be over-pricing fuelwood's true value. For these reasons no projections of fuelwood production or estimates of its value are given here.

MISCELLANEOUS

In West Virginia miscellaneous industrial wood includes principally turnery stock, handle stock, and miscellaneous farm timbers. In 1965 the production of this miscellaneous wood industry totaled 1,031 thousand cubic feet, all of which was hardwood. Because products and prices vary greatly, we did not attempt either to project future output or to determine the value of this production.

A 100-percent canvass of all known producers of handle stock, turnery stock, and other miscellaneous products, and a 100-percent field follow-up of all nonrespondents in these categories were conducted. The estimate of miscellaneous farm timbers was developed as part of the fuelwood canvass.

Conclusion

The results of this study indicate that the nadir of West Virginia's timber-products output apparently has been reached, and that the production of the State's forest based industry is rising again. With a base of 11,389,000 acres of commercial forest land—74 percent of the total land area—the woodlands of West Virginia, if wisely managed, will be able to maintain and increase their contribution to the State's economy.

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Appendix

DEFINITIONS OF TERMS

Forest Area

Forest land area. — This includes: (a) lands that are at least 10 percent stocked with trees of any size and are capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and that has not been developed for other use; and (c) afforested areas. (Forest tracts of less than 1 acre, isolated strips of timber less than 120 feet wide, and abandoned fields and pastures not yet 10 percent stocked with trees are excluded.)

Commercial forest land area. — Forest land that is (a) producing, or physically capable of producing, crops of industrial wood (usually sawtimber); (b) economically available now or prospectively; and (c) not withdrawn from timber utilization through statute, ordinance, or administrative order.

Noncommercial forest land area. — Forest land that is (a) withdrawn from timber utilization through statute, ordinance, or administrative order, but that otherwise qualifies as commercial forest land; or (b) incapable of yielding industrial wood products (usually sawtimber) because of adverse site conditions.

Timber Volume

Growing stock. — Net volume, in cubic feet, of live sawtimber and poletimber trees (see definitions under "Class of Timber") from stump to a minimum 4-inch top (of central stem) outside bark. Net volume equals gross volume less deduction for rot.

Sawtimber volume. — Net volume in board feet, International ¼-inch rule, of merchantable sawlogs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use for lumber.

Standard cord. — A unit of measure for stacked wood encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates by applying a factor of 80 cubic feet of wood (inside bark) per rough cord.

Tree Classes

All trees. — All live sawtimber and poletimber trees, seedlings and saplings, and all live cull trees.

Growing-stock trees. — All live sawtimber trees, poletimber trees, and seedlings and saplings, except cull trees. (See definitions under "Class of Timber.")

Class of Timber

Sawtimber trees. — Trees of commercial species that: (a) are of the following minimum diameters at breast height — softwoods 9.0 inches and hardwoods 11.0 inches; and (b) contain at least one merchantable sawlog. (A merchantable sawlog is a portion of a live tree that meets the minimum log-grade specifications, as defined under log-grade classification. The sawlog portion is that part of the tree between the stump and the top of the last merchantable sawlog.)

Poletimber trees. — Trees of commercial species that meet regional specifications of soundness and form, and are of the following diameters at breast height; softwoods 5.0 to 9.0 inches; hardwoods 5.0 to 11.0 inches. Such trees will usually become sawtimber trees if left to grow.

Sapling-and-seedling trees. — Trees of commercial species that are less than 5.0 inches in diameter at breast height and of good form and vigor.

Cull trees. — Live trees of sawtimber or poletimber size that are unmerchantable for sawlogs now or prospectively because of defect or rot, or because they are of noncommercial species.

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